STATE OF NEW MEXICO
WATER QUALITY CONTROL COMMISSION

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WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF:
APPEAL OF SUPPLEMENTAL DISCHARGE PERMIT FOR CLOSURE (DP-1341) FOR PHELPS DODGE TYRONE, INC.,

Petitioner.

Docket Nos.
WQCC 03-12(A)
WQCC 03-13(A)
(Consolidated)

DECISION and ORDER ON REMAND

THIS MATTER came before the Water Quality Control Commission (the "Commission") upon a mandate from the New Mexico Court of Appeals in the matter titled *Phelps Dodge Tyrone, Inc., v. N.M. Water Quality Control Commission and New Mexico Environment Department*, 2006-NMCA-115, 140 N.M. 464, *cert. denied* 2006-NMSC-9, 140 N.M. 542, wherein the Court of Appeals ruled that the Commission's determination that the entire Tyrone Mine Site was "a place of withdrawal of water for present or reasonably foreseeable future use" under Section 74-6-5(E)(3) of the Water Quality Act was overly broad. As a result, the Court of Appeals reversed permit conditions 4 and 17 of the Supplemental Discharge Permit for Closure ("DP-1341"), and remanded the case back to the Commission for further limited proceedings. The Court of Appeals' mandate directs the Commission in this proceeding to "create some general factors or policies to guide its determination" with respect to the meaning of "place of withdrawal for the purposes of Section 74-6-5(E)(3)." See 2006-NMCA-115, ¶¶ 33-35. It further states that the Commission "may adopt appropriate factors to guide its discretion, apply them, and conclude that NMED has established reasonable conditions that are based on a reasonable place, or reasonable places, of withdrawal." See 2006-NMCA-115, ¶ 37. Finally, the Court of Appeals' decision "does not preclude the Commission, on remand, from reaching the same result that it previously reached and affirming conditions 4 and 17." Id. Prior to hearing the remand and pursuant to WQCC rules, in addition to New Mexico Environment Department ("NMED") and Phelps Dodge Tyrone, Inc. ("Tyrone"), the Commission granted party status to the Gila Resources Information Project ("GRIP") and Watermatters, LLC.

In accordance with the mandate, the Commission held 24 days of hearing between July 23 and December 13, 2007. It received testimony from approximately 25 witnesses and afforded all parties the opportunity to cross-examine witnesses. The parties filed written testimony with the Commission on July 9, 2007. The parties submitted proposed findings of fact, conclusions of law and closing briefs on March 28 and May 12, 2008. The Commission heard oral argument on July 7, 2008 and deliberated on this matter on July 8, August 11 and 12, September 8 and 9, October 14, December 15 and 16, 2008, and January 12, 2009.

The Commission, being familiar with the hearing record, which consists of 24 volumes of certified hearing transcripts totaling approximately 5956 pages, the pleadings submitted by the parties, and the exhibits duly admitted into the record, hereby makes the following findings of fact, and conclusions of law:

GENERAL FINDINGS OF FACT

1. The Tyrone Mine is a large copper mining facility located 10 miles southwest of Silver City in Grant County, New Mexico. The Tyrone Mine encompasses the central "Mining Area" and the "Mangas Valley Tailing Area" to the north. Both areas contain disturbed areas and facilities that are sources and potential sources of ground water contamination. DP-1341 addresses each of these contamination sources, although only the Mining Area is the subject of this appeal. NMED Exhibit 3 at 1-3.

2. The Mining Area of the Tyrone Mine comprises the primary mining operations. It includes several active and inactive open pits, known at the Main Pit, the West Main Pit, the Valencia Pit, the Gettysburg Pit, the Copper Mountain Pit, the South Rim Pit, the Savanna Pit, and the San Salvador Hill Pit. Waste rock from the pit excavations has been deposited in piles near and adjacent to the open pits. These piles have been labeled the Nos. 1C, 1D, 3B, Savanna, and Upper Main Waste Rock Piles. Leachable grade ore from the pits also has been placed in several stockpiles near and adjacent to the open pits. The piles are labeled the Nos. 1, 1A, 1B, 2, 2A, 3A, East Main, Gettysburg Out-Pit, and Gettysburg In-Pit Leach Ore Stockpiles. The leach ore stockpiles and waste rock piles at the Tyrone Mine cover approximately 2,800 acres and contain approximately 1.7 billion tons of rock. Tyrone extracts copper from the leach ore stockpiles by spraying an acidic raffinate solution over the tops and sides of the piles – which then percolates through the piles and leaches the entrained copper from the ore – and collecting the fluid as pregnant leach solution ("PLS") in catchments at the toe of the piles. The PLS is then processed in the solvent extraction and electrowinning plant ("SX/EW plant"), also located in the Mining Area, which extracts commercial grade copper from the PLS. NMED Exhibit 3 at 1-3.

3. Phelps Dodge Tyrone, Inc., Tyrone Mining, LLC, and Pacific Western Land Company are subsidiary companies to Phelps Dodge Corporation. Phelps Dodge Corporation is a wholly-owned subsidiary of Freeport McMoRan Copper & Gold, Inc. Shelley, Tr. Vol. 1, p. 92, line 14 to p. 93, line 4.

4. Tyrone and/or other Phelps Dodge-affiliated companies own the vast majority of the lands inside and immediately surrounding the permit boundary established by the

Mining and Minerals Division of the New Mexico Energy, Minerals and Natural Resources Department pursuant to the New Mexico Mining Act ("MMD Permit Boundary"). Tyrone Exhibit 910 depicts land status and land ownership both inside and outside the MMD Permit Boundary. Tyrone Exhibit 910; Shelley, Tr. Vol. 1, p. 60, lines 8-9.

5. The companies that own land in the vicinity of the Tyrone Mine are Phelps Dodge Corporation, Phelps Dodge Tyrone, Inc., Tyrone Mining, LLC, and Pacific Western Land Company. Shelley, Tr. Vol. 1, p. 91, lines 5-13, Tyrone Exhibit 910.

6. The MMD Permit Boundary at the Tyrone Mine facility encompasses the mine site and comprises approximately 12,500 acres. Shelley, Tr. Vol. 1, p. 46-48, p. 58, lines 1-4; Tyrone Exhibits 909-910.

7. Approximately 9,500 acres inside the MMD Permit Boundary have been disturbed by mining activities; approximately 3,000 acres are undisturbed. Mohr, Tr. Vol. 2, p. 402, lines 24-25 and p. 403, line 1.

8. Approximately 3,000 acres inside the MMD Permit Boundary are used for various types of mining support and maintenance activities at the mine site, including transportation, monitoring wells, and utilities. Mohr, Tr. Vol. 2, p. 408, lines 14-25 and p. 409, lines 1-12.

9. As a general matter, NMED took the position that the entire Tyrone Mine site is a place or places of withdrawal of water for present or reasonably foreseeable future use, and therefore, the ground water underneath the mine site should be protected. NMED Opening Statement, Tr. Vol. 7, p. 1865, line 23 to p. 1866, line 18.

10. As a general matter, Tyrone took the position that the lands inside the MMD Permit Boundary do not constitute places of withdrawal of water for present of reasonably foreseeable future use and, therefore, with minor exceptions, standards need not be met inside the MMD Permit Boundary. Tyrone Opening Statement, Tr. Vol. 1, p. 43, lines 15-22.

11. Tyrone asserted that (1) its active on-going control of the property at the mine combined with (2) its commitment to pump and treat groundwater (and the associated financial assurance) for a 100-year period following closure of the mine, combined with (3) proprietary institutional controls that will restrict the future of owners and occupants use of the surface estate and the drilling of wells at the mine site, and (4) other factors collectively support its contention that it need not meet ground water quality standards inside the MMD Permit Boundary. See Tyrone's Statement of Intent to Present Technical Evidence, July 9, 2007, pgs. 2, 4-7; Tyrone Opening Statement, Tr. Vol. 1, p. 1, lines 35-40.

12. For purposes of this proceeding, Tyrone is treating the lands owned by third parties within the MMD Permit Boundary as though the MMD Permit Boundary has been adjusted to exclude the third-party lands from the area inside the MMD Permit Boundary. Mohr, Tr. Vol 2, p. 322, lines 2-10; Shelley, Tr. Vol. 19, p. 4617, line 15- p. 4618, line 3.

13. Tyrone has stated that it intends to meet ground water standards at those private parcels within the MMD Permit Boundary. Mohr, Tr. Vol. 2, p. 401, lines 3-14.

14. The Water Quality Act and WQCC Regulations do not distinguish between operational permits and closure permits, and generally, a facility's operating

requirements and closure plan are contained within one facility discharge permit. Tyrone, however, is a more complex site than most and has two types of discharge permits: operational permits and a closure permit. Menetrey, Tr. Vol. 9, p. 2414, line 1 to p. 2415, line 1; NMED Exhibit 11, at 4.

15. Between 1978 and 2007, NMED has issued a total of nine ground water discharge permits for discharges resulting from operation of the Tyrone Mine. The various operational permits address the different discharge areas within the MMD Permit Boundary. The operational permits currently active for Tyrone are designated DP-166, DP-286, DP-363, DP-383, DP-435, DP-455, DP-670, and DP-896. Menetrey, Tr. Vol. 9, p. 2411, line 15 to p. 2413, line 24; p. 2414, line 17 to p. 2415, line 1; NMED Exhibit 13.

16. The fundamental purpose of each of the operational permits is to prevent ground water contamination underneath and around the areas of the mine that are permitted and to require abatement of ground water contamination that has occurred. Menetrey, Tr. Vol. 9, p. 2418, line 7 to p. 2419, line 13.

17. The operational permits primarily address the operational phase of the individual facilities at the Tyrone Mine and currently include requirements for pollution prevention measures during operations, ground water monitoring, contingency plans, abatement of ground water contamination, and corrective action in the event of unauthorized discharges. The operational permits also include specific closure measures that are not included in the more general closure permit. Menetrey, Tr. Vol. 9, p. 2415, lines 2-8; NMED Exhibit 11, at 4, 6-11.

18. None of the operational permits authorizes Tyrone to contaminate ground water in excess of ground water standards; none of the operational permits authorizes any form of natural attenuation as a treatment, containment or mitigation measure; and none of the operational permits defines or mentions a place of withdrawal of water for present or reasonably foreseeable future use. Menetrey, Tr. Vol. 9, p. 2775, line 22 to p. 2776, line 5; p. 2852, line 19 to p. 2853, line 5; p. 2857, lines 4-9; Olson, Tr. Vol. 7, p. 1922, lines 1-25; Tr. Vol. 8, p. 2004, lines 1-4.

19. Presently, Tyrone has numerous abatement activities underway as a result of its failure under its operational permits to prevent ground water contamination at the site. Tyrone is working on Stage 1 of an abatement plan for investigation of surface water, ground water, and vadose zone contamination. Tyrone is expected to submit a final report on the Stage 1 investigation in December 2008. Menetrey, Tr. Vol. 9, p. 2420, lines 4-17.

20. NMED determined that for the Tyrone Mine it was preferable to have a separate closure permit to address closure issues at all of the facilities at the Tyrone Mine. It was seen as more efficient to address site-wide closure issues in one document and in one proceeding. Menetrey, Tr. Vol. 9, p. 2417, line 2 to p. 2418, line 6.

21. DP-1341 is issued to Phelps Dodge Tyrone, Inc. NMED Exhibit 3.

22. DP-1341 supplements each of the nine operational permits and broadly addresses closure requirements for the Tyrone Mine that generally apply on a site-wide basis, including but not limited to requirements for regrading and covering of tailings and stockpiles, general closure of open pits and surface impoundments, closure of buildings and pipelines, site-wide abatement of ground water contamination, and long-

term water treatment, post-closure monitoring, financial assurance, and studies that need to be conducted to address certain closure requirements. Menetrey, Tr. Vol. 9, p. 2415, lines 9-20; NMED Exhibit 11, at 5.

23. DP-1341 is closely related to and dependent on the conditions and requirements of each of the operational permits. Decisions affecting DP-1341 have the potential to significantly affect the existing terms and conditions of the operational permits, many of which have been in place for decades. Menetrey, Tr. Vol. 9, p. 2416, lines 17-22; NMED Exhibit 11, at 5.

24. DP-1341's current requirements are a continuation of permitting actions previously conducted under each of the operational permits for over a 20-year period. NMED Exhibit 11 at 11-12; Menetrey, Tr. Vol. 9, p. 2421, lines 8-11.

25. The leach ore stockpiles, waste rock piles and tailing impoundments at the Tyrone Mine all contain mineral sulfides which, when oxidized, generate acidic solutions. NMED Exhibit 15 at 9; Marshall, Tr. Vol. 11, p. 2940, lines 11-20.

26. Acid rock drainage occurs both in the leach ore stockpiles, which are actively leached, and in the waste rock piles, which are not. Marshall, Tr. Vol. 11, p. 2939, lines 23-25, p. 2940, lines 1-3; AR 1341 A-286.

27. This leachate from the acid rock drainage and from the leaching process has moved directly or indirectly into surface water and ground water. NMED Exhibit 15 at 9; Marshall, Tr. Vol. 11, p. 2941, lines 11-18, p. 2946, lines 10-18; Menetrey, Tr. Vol. 11, p. 2896, lines 2-10.

28. Tyrone studies have concluded that acid generation in the leach ore stockpiles and waste rock piles will continue to occur for 300 years or more. NMED Exhibit 1 at 22; Olson, Tr. Vol. 8, p. 2150, lines 18-24; NMED Exhibit 10 at 2.

29. Geochemical modeling performed by Tyrone predicts the generation of acid mine drainage from the stockpiles for more than 200 years. AR-1341 C-30.

30. Tailings from the former milling operations at the Tyrone Mine were deposited in a series of tailing impoundments in the Mangas Valley. Tyrone is currently closing these impoundments. NMED Exhibit 15 at 10.

31. Ground water within the Mangas Valley Tailings Area has been degraded by leachate from the tailing impoundments located along the perimeter of the valley. NMED Exhibit 15 at 10.

32. Currently, sulfate and total dissolved solids ("TDS") either exceed WQCC water quality standards or are trending upward toward the standards in various monitoring wells downgradient of the Nos. 1, 1X, 2 and 3X Tailing Impoundments and in ground water adjacent to the No. 1 Tailing Impoundment. Sulfate is a precursor to other more toxic contaminants such as metals. NMED Exhibit 15 at 10.

33. Regional ground water quality within the Central Mining Area has been severely degraded by mining operations. Ground water quality has been degraded along the perimeters of the mine site on the north, west, south and east sides. Ground water contamination has been discovered moving offsite and into the alluvial and regional aquifers. NMED Exhibit 15 at 10-11; Marshall, Tr. Vol. 13, p. 3333, line 21 to p. 3334, line 8; Tyrone Exhibit 926.

34. Some of the ground water within the Central Mining Area exceeds water quality standards by over 10 times for TDS, sulfate, nickel, cobalt, and copper, and by 1000 times for aluminum, cadmium, iron, manganese and zinc. NMED Exhibit 15 at 11; NMED Exhibit 19.

35. On the north side of the mine, leaching operations at the 3A Leach Stockpile have resulted in extensive ground water contamination of the alluvial and regional aquifers underlying the head of Mangas Wash. Since 1990, an extensive ground water investigation and remediation system has been implemented, including the installation of several hundred monitoring wells in both the shallow and regional aquifers. NMED Exhibit 15 at 11.

36. On the west side of the mine, seepage of acid rock drainage from the Nos. 2 and 2A Leach Stockpiles, as well as from historic operations, has caused contamination of surface water and ground water within Deadman Canyon. NMED Exhibit 15 at 11; Marshall, Tr. Vol. 11, p. 2942, lines 15-25.

37. On the south side of the mine, seepage from the No. 1C Waste Rock Pile has contaminated the alluvial and regional aquifers within and along Oak Grove Draw. NMED Exhibit 15 at 11.

38. Some of the most extensive and complex ground water contamination at the Tyrone Mining Facility is located on the east side of the mine. In May 1996, Tyrone discovered pregnant leachate solution approximately 20 feet below ground surface. An extensive subsurface investigation revealed a plume of highly contaminated ground water in the alluvial aquifer extending 3.5 miles from the mine perimeter. Regional

ground water on the east side has also been degraded from leaching operations. Marshall, Tr. Vol. 11, p. 2945, line 8 to p. 2946, line 18.

39. Presently, ground water coming into the mine area from the southwest off the Big Burro Mountains is of good quality. NMED Exhibit 15 at 9.

40. Data collected in 2001 from monitoring well MW 2-11, located upgradient of the Tyrone Mine near the No. 2 Leach Ore Stockpile and completed in the regional aquifer, shows TDS concentrations of 380 mg/L and sulfate concentrations of 67 mg/L, in compliance with ground water standards. Comm'n Hr'g (2003) Marshall Test. Tr. Vol. 5, p 1232, line 17 to p. 1233, line 18; NMED Exhibit 20, Table 14.

41. Data collected in 2001 from monitoring well TWS-8, located upgradient of the Tyrone Mine in Deadman Canyon, shows TDS concentrations of 220 mg/L and sulfate concentrations of 37 mg/L, in compliance with ground water standards. Comm'n Hr'g (2003) Marshall Test. Tr. Vol. 5, p 1233, line 22 to p. 1234, line 2; NMED Exhibit 20, Table 14.

42. NMED's hydrogeologist, Clint Marshall, presented more detailed testimony on the ground water contamination in the Central Mining Area during the Commission's initial hearing in 2003. Comm'n Hr'g (2004) Marshall, Tr. Vol. 5, pgs. 1236, line 1 to 1278, line 15.

<u>Adoption of WQCC Regulations and the Phrase "Place of Withdrawal of Water for Present or Reasonably Foreseeable Future Use"</u>

43. As early as April 1967, WQCC Commissioner and State Engineer Steve Reynolds used the phrase "present or reasonably foreseeable future beneficial use" in a letter to A.L. Porter, director of the Oil Conservation Commission, within which letter the State Engineer designates "all underground water in the State of New Mexico

containing 10,000 parts per million or less of dissolved solids . . . pursuant" to NMSA 1953, Section 65-3-11(15); "except that this designation shall not include any water for which there is no present or reasonably foreseeable beneficial use that would be impaired by contamination." NMED Exhibit 9.

44. Prior to the June 1976 public hearings on the proposed ground water quality regulations, NMED's predecessor, the Environmental Improvement Agency ("EIA"), organized an Ad Hoc Technical Advisory Committee, composed primarily of EIA and industry representatives, to provide input into drafting the regulations. The Committee met several times between April and December 1975. NMED Exhibit 67; Nylander, Tr. Vol. 21, p. 5245, lines 21-24.

45. The April 29, 1975 meeting minutes of the Ad Hoc Technical Advisory Committee indicate that the meeting "was devoted to discussion of points presented by EIA as the basis for regulations." NMED Exhibit 67; Nylander, Tr. Vol. 21, p. 5242, line 21 to p. 5243, line 1.

46. The April 29, 1975 minutes further indicate that among EIA's bases for regulation of ground water was, "[t]he use of property boundaries is not an appropriate method for determining boundaries of allowable ground water degradation." On this point, the April 29 meeting minutes indicate that while "there was discussion of where monitoring should be done to assure that criteria are being met," the only agreement among the Committee members "was general agreement that this is a question that needs to be discussed further at a future meeting and clarified." NMED Exhibit 67; Nylander, Tr. Vol. 21, p. 5243, line 24 to p. 5244, line 21.

47. At the Committee's July 11, 1975 meeting, EIA offered the following clarification:

> The aim is that all ground water shall be protected to the extent provided in paragraphs 1 [all ground water with a TDS less than 10,000 mg/l shall be protected for present or possible future domestic and agricultural use] and 2 [new sources must prevent contamination; existing sources must contain it], including ground water inside the discharger's property boundaries and ground water directly under or adjacent to a discharge. In order to verify that the ground water is being adequately protected, monitoring in the ground water should be as close as possible to the point where contaminants are expected to enter the ground water, or in the case of an approved limited volume of contaminated aquifer, as close as possible to the boundary of the contaminated volume; monitoring at the property boundary or at the subsequent user's well is not adequate.

NMED Exhibit 67.

48. The Committee's July 11, 1975, minutes further indicate:

> There was some disagreement with EIA's position, but no particular confusion on what the EIA means by meeting criteria in all ground water and verifying this as close as possible to where contaminants are expected to enter the ground water.

NMED Exhibit 67.

49. John Dudley, the EIA witness representing the agency in the June 1976 rule making hearings, testified:

> The purpose of these regulations is to protect groundwater which may be recovered from springs or wells in useful quantities for domestic or other use. In essence, these regulations attempt to address that portion of ground water, which as defined in the classical sense, which occurs in aquifers. Because the meaning of the term aquifer may not be clearly understood by the general public, the staff felt the term should not be used in the definition of ground water and instead the concept of water being available in sufficient amounts to be utilized as a water supply was stated in the definition.
>
> These definitions for aquifer and ground water all lack precise quantification of measurable physical and hydrological properties and this omission was intentional. For example, an aquifer which, say, yields a hundred gallons of water a day to a well in a desert region, characterized by water bearing formations with poor productivity, would not even be considered as a sourse (sic) of ground water if it were found in an alluvial valley filled with sand

> and gravel aquifers, which might be capable of yielding several thousands of gallons of water per day to a well.
>
> The definition of ground water proposed in these regulations was drafted to allow the availability of ground water as well as current and projected use patterns in a particular area to be evaluated when judging whether or not a certain saturated zone contains ground water worthy of protection.

Watermatters Rebuttal Exhibit 2 (June 1976 Tr., p. 15, line 13 to p. 16, line 15).

50. Transcripts of the June 1976 rule making hearing do not contain any discussion of or reference to using the discharger's property boundary as the point of compliance with standards. Nylander, Tr. Vol. 21, p. 5246, lines 3-14.

51. The proposed regulations considered during the June 1976 rule making hearing did not identify the discharger's property boundary as the place where compliance with ground water standards would be measured. Nylander, Tr. Vol. 21, p. 5247, lines 13-22.

52. Commissioner Reynolds introduced the phrase "place of withdrawal for present and future use" during the December 1976 deliberations. The minutes state:

> Before consideration of the section by section wording of the amendments was begun, there was, at the request of Mr. Reynolds, a discussion of the general philosophy of the proposed amendments. Mr. Reynolds said that there is an obvious need for the Commission to protect ground water for use, but there have been difficulties in determining where the measurements shall be made and in making it clear where the burden of proof lies. Mr. Reynolds distributed copies of language he would propose for inclusion in subsection 2-410 C. which he believed would place the basic burden proof where it belongs, on the discharger to prove that his discharge would not impair any other use of ground water. This would be parallel to water rights law where a permit cannot be granted except with a finding that other water rights will not be impaired. Mr. Reynolds concluded that it would be an excessive burden on the director if he had to prove that there would in each case be damage. The Commission agreed with the philosophy of the language offered.

Tyrone Exhibit 902, December 1976 WQCC Minutes, Att. A at 1-2.

53. In December 1976, the Commission came to a consensus on language to include in the regulations. That language largely conforms to the text of the current regulations at 20.6.3.3109C NMAC and provides that a discharge should be allowed when the "person proposing to discharge demonstrates that the approval of the plan will not result in either concentrations in excess of the standards of Section 2-403 or the presence of toxic pollutants at any place of withdrawal of water for present or reasonably foreseeable future use." Tyrone Exhibit 902 at 9-10, December 1976 WQCC Minutes, Att. A, at 13-14.

54. The Commission adopted the proposed ground water quality regulations to implement the Act in January 1977. The regulations were adopted following public hearings in June 1976 and several days of deliberations in December 1976 and January 1977. The regulations were supported by a formal statement of reasons and became effective in February 1977. Tyrone Exhibit 902, pgs. 3-4; Garber, Tr. Vol. 2, pgs. 523, 524; Nylander, Tr. Vol. 15, p. 16, lines 11-21.

55. The ground water quality regulations establish numerical ground water standards and obligate dischargers to obtain discharge permits. The regulations make clear that the basic burden of proof was on the discharger "to prove that his discharge would not impair any other use of the ground water"; "to show that the discharge would not reach water in order for a discharge plan requirement not to be applicable"; to "demonstrate that a hazard does not exist"; and to demonstrate "that his discharge will not impair another present or reasonably foreseeable future water use." Tyrone Exhibit 902, December 1976 WQCC Minutes, Att. A at 2, 7, 13 and 14.

56. During the 1976 deliberations, Commissioner Reynolds explained that the discharger's burden of proof under the Commission's regulations "would be parallel to water rights law where a permit cannot be granted except with a finding that other water rights will not be impaired." Tyrone Exhibit 902, December 1976 WQCC Minutes, Att. A at 1-2

57. The Commission made clear that its intent "was not to require cleanup of contamination that occurred before the regulations were adopted, but neither was it their intent to allow without regulation future discharges which would contribute to either the spread of contamination into presently uncontaminated areas or the aggravation of contamination, which would interfere with *future* uses." Tyrone Exhibit 902, December 1976 WQCC Minutes, Att. A at 3 (emphasis added).

58. Although the Commission discussed the phrase "place of withdrawal for present or reasonably foreseeable future use" during the December 1976 deliberations and agreed to its inclusion in various sections of the regulations, the Commission did not define the phrase during its discussion or in the regulations. Tyrone Exhibit 902, December 1976 WQCC Minutes, Att. A at 1-2, 3, 4, 13, and 14.

59. The ground water regulations adopted by the Commission in January 1977 did not identify the discharger's property boundary as the point of compliance. Nylander, Tr. Vol. 21, p. 5247, line 23 to p. 5248, lines 5.

60. In a February 26, 1987 letter to the U.S. Environmental Protection Agency, commenting on the EPA's *Final Draft dated November 1986 of Guidelines for Ground Water Classification Under the EPA Ground Water Protection Strategy*, then Environmental Improvement Division ("EID") director Michael Burkhart described the

ground water quality regulations adopted by the Commission in January 1977 as follows:

> The regulations to protect ground water quality adopted by the Water Quality Control Commission in 1977 established a ground water classification system having two classes:
>
> A. Protected under the regulations for present and potential future use as a domestic and agricultural water supply is *all* ground water having a concentration of 10,000mg/l or less total dissolved solids (TDS) . . .
> B. Not protected under New Mexico regulations are any ground waters with a TDS concentration exceeding 10,000mg/l, except insofar as they may impact other waters of better quality.

Comm'n Hr'g (2003) NMED Exhibit 15, Comments p. 2 (emphasis added).

61. Comparing WQCC regulations with EPA's ground water protection strategy, Mr. Burkhart noted that "[b]oth systems assume that ground water not in present use is potentially usable unless demonstrated otherwise." He further stated that although "phrased differently in the two systems, both classify aquifers with relatively low yields as potential sources of water, thus recognizing the fact that enough water to supply a single rural family can be a valuable resource . . . such as ten gallons per day for a cabin." Comm'n Hr'g (2003) NMED Exhibit 15, Comments, p. 3.

62. The EID Director also stated that the "discharger must demonstrate that his discharge will not cause standards to be violated in ground water," and the "WQCC system gives the same protection to present and potential *future* uses of ground water." The Director concluded that the "WQCC system has been in use in New Mexico for ten years, since 1977. Experience has shown that this relatively clear and easily understood system is very effective in protecting ground water quality in the state." Comm'n Hr'g (2003) NMED Exhibit 15, Comments p. 3 and 4 (emphasis added).

63. While Watermatters rebuttal witnesses testified that EIA's early practice was to use the discharger's property boundary as the place where ground water standards had to be met, none of the Tyrone or Watermatters witnesses was able to identify any written policy that identified the discharger's property boundary as the place of withdrawal where compliance with standards would be measured. Drypolcher, Tr. Vol. 21, p. 5217, line 23 to p. 5218, line 6; Longmire, Tr. Vol. 23, p. 5804, lines 8-13; Hicks, Tr. Vol. 5, p. 1181, line 22 to p. 1182, line 5; Gutiérrez, Tr. Vol. 4, p. 905, lines 13-18.

64. Dr. Patrick Longmire, a former EID staff member, worked in the Ground Water Quality Bureau ("GWQB") on implementation of the ground water quality regulations from 1980 to 1983. Longmire, Tr. Vol. 23, p. 5771-5772.

65. Dr. Longmire had experience applying the ground water quality regulations because he was assigned to review discharge plans for uranium and other large discharge facilities. He worked on the Kerr McGee/Ambrosia Lake site, the Church Rock site, and the Homestake facility. At all of these sites, Dr. Longmire evaluated ground water contamination and ground water chemistry. Longmire, Tr. Vol. 23, p. 5773, lines 1-25 and p. 5774, lines 1-4.

66. Dr. Longmire's training in how to determine the place of compliance with ground water standards came through guidance from and discussions with individuals including Maxine Goad, Bruce Gallaher, and Ron Conrad. Longmire, Tr. Vol. 23, p. 5775, lines 19-25.

67. Dr. Longmire testified that during his tenure at EID the agency used the discharger's property boundary as the place of withdrawal where compliance with ground water standards would be measured <u>only</u> for pre-existing facilities where ground

water contamination already existed. EID did not use the property boundary as the place of withdrawal for new discharges. Longmire, Tr. Vol. 23, p. 5775, lines 1-17; p. 5803, lines 10-13.

68. Dr. Longmire further testified that the property boundary was not used for sites with petroleum hydrocarbon contamination; those sites were required to meet standards within the facility. Longmire, Tr. Vol. 23, p. 5776, line 21 to p. 5777, line 3.

69. Anthony Drypolcher, another former EID staff member, worked at EID from the early 1970s to the 1980s, specifically addressing water quality issues for both surface water and ground water. In his final years at EID, Mr. Drypolcher was GWQB Bureau Chief. Drypolcher, Tr. Vol. 21, p. 5208, line 25 to p. 5210, line 14.

70. Mr. Drypolcher testified that EID staff and dischargers with proposed plans had an "understanding" that the property boundary was where ground water standards had to be met. Drypolcher, Tr. Vol. 21, p. 5211, line 21 to p. 5212, line 3.

71. When asked, "did you verbally instruct your staff that that's how permits were to be approved," Mr. Drypolcher replied, "I don't think so. No." Drypolcher, Tr. Vol. 21, p. 5218, lines 15-18.

72. Randall Hicks was a supervising hydrologist in the permitting section of EID from the spring of 1980 to the fall of 1983. He gained experience implementing the ground water quality regulations at EID. Mr. Hicks was the chief reviewer for Kerr McGee/Quivira Mining uranium mill site, although he left EID before the discharge permit for that site was issued. He also reviewed discharge plans for municipal facilities, including sites at Questa and Roy, New Mexico, as well as for numerous

dairies in the state. Hicks, Tr. Vol. 5, pages 1161-1162; p. 1163, lines 4 to p. 1164, line 2; p. 1277, line 25 to p. 1278, line 2.

73. Mr. Hicks testified that during the time he worked at EID, "it was an understanding that the property line was the point of reasonably foreseeable future use . . . it's not science, it's just what people do." Hicks, Tr. Vol. 5, p. 1182, line 21 to p. 1183, line 21.

74. Mr. Hicks further testified that EID used the discharger's property boundary as the "default location" in the absence of other considerations, but if there were a well or other issues, "we would not use the property boundary." Hicks, Tr. Vol. 5, p. 1201, line 17 to p. 1202, line 7.

75. Six former EIA/EID staff members provided affidavits in this proceeding attesting to the use of a discharger's property boundary for determining the place of withdrawal of water for present or reasonably foreseeable future use. The affidavits were from John Dudley, Albert Dye, Patrick Longmire, Ron Conrad, Anthony Drypolcher, and Ken McCallum. Nylander, Tr. Vol. 15, pages 5116-5118.

76. No witness was able to identify any discharge permit that expressly established the discharger's property boundary as the place of withdrawal where standards would be measured or met. See Gutiérrez, Tr. Vol. 3, p. 843, line 23 to p. 844, line 8; Tr. Vol. 4, p. 903, line 19 to p. 904, line 4; Nylander, Tr. Vol. 21, p. 5249, lines 12-17.

77. Alberto Gutiérrez, a consulting hydrologist, draws on experience in New Mexico as both a private consultant to entities seeking discharge permits as well as a former member of the WQCC and the Environmental Improvement Board. Gutiérrez, Tr. Vol. 3, pages 777-780; Tyrone Exhibit 902, Att. 2 (Gutiérrez Curriculum Vitae).

78. In his capacity as a consultant beginning in the early 1980s, Mr. Gutiérrez worked directly with NMED (and its predecessor agency) staff in permitting ground water discharge sites. Mr. Gutiérrez was responsible for negotiating with NMED the closure of a number of hazardous and non-hazardous waste treatment units at the NASA White Sands Test Facility ("WSTF"). His work included the placement of dozens of monitoring wells to evaluate the effect of past and ongoing discharges at WSTF. Gutiérrez, Tr. Vol. 3, pages 787-788 and p. 792, lines 4-23.

79. Asked whether the Water Quality Control Commission in 1977 could have mentioned the property boundary as the place of foreseeable future use, Mr. Gutiérrez acknowledged that the Commission could have but that "there could be specific situations that might call for a different definition," and cited the Fortuna Wells within the Tyrone Permit Boundary as one such situation. Gutiérrez, Tr. Vol. 4, p. 904, lines 11-22.

80. Mr. Gutiérrez described the Commission's decision to use the place of withdrawal for present or reasonably foreseeable future use language without reference to property boundary in its regulations as "very wise actually" because it acts as a "balancing point" and provides "a greater degree of flexibility" for determining where compliance with standards needs to be met. Gutiérrez, Tr. Vol. 4, p. 904, line 23 to p. 905, line 11.

81. Similarly, when asked whether the Commission easily could have expressed in the regulations that the property boundary is the point of compliance, Charles Nylander testified that it would not have been easy due to the differences in property size, property boundaries, the discharger's site-specific plans, the nature of the discharge, and

the area into which they were discharging. In sum, Mr. Nylander testified, "it's a case-by-case basis." Nylander, Tr. Vol. 21, p. 5251, line 21 to p. 5253, line 11.

82. William Olson has served as GWQB Bureau Chief since October 2004. He has worked under the Water Quality Act and WQCC regulations issuing discharge permits and overseeing soil and ground water abatement reclamation activities with NMED and the Energy Minerals and Natural Resources Department ("EMNRD") since 1986. He served as a commissioner on the WQCC for 13 years, as a designee for the Oil Conservation Commission ("OCC"), and currently serves as commissioner on the OCC. Olson, Tr. Vol. 7, pages 1871-1873; NMED Exhibit 2.

83. Mr. Olson testified that NMED's practice for at least the last 21 years has been to ensure that all ground water underneath a discharge site meets ground water quality standards. NMED has not used the property boundary as the place of withdrawal. Olson, Tr. Vol. 7, p. 1921, line 11 to p. 1922, line 7; p. 1926, lines 6-7; p. 1941, lines 1-17; Tr. Vol. 23, p. 5656, lines 1-22.

84. Mary Ann Menetrey has been employed by NMED since 1991 and has been Program Manager of the GWQB's Environmental Compliance Section since 2000. She acts as NMED Mining Act Team Leader and is responsible for coordinating NMED's role implementing the New Mexico Mining Act. Ms. Menetrey was the discharge permit lead for two Tyrone operational permits, DP-166 and DP-27. NMED Exhibit 12.

85. Prior to her testimony, Mary Ann Menetrey reviewed substantial portions of all NMED permit files for Tyrone's operational discharge plans going back to the early days of discharge permitting for those sites. Menetrey, Tr. Vol. 10, p. 2501-2503.

86. Ms. Menetrey did not recall any places in the administrative record of the Tyrone discharge permits where there was discussion between NMED and Tyrone as to what was a place of withdrawal for present or reasonably foreseeable future use. Menetrey, Tr. Vol. 9, p. 2452-2454.

<u>Defining "Place of Withdrawal of Water"</u>

87. Tyrone currently withdraws ground water from a number of locations inside the MMD Permit Boundary:

a. Tyrone withdraws 4000 to 5000 acre-feet of ground water per year for mining purposes from one or more open pits. Blandford, Tr. Vol. 7, p. 1719, lines 11-13; Shelley, Tr. Vol. 1, p. 73, line 21 to p. 74, line 5;

b. Tyrone withdraws variable amounts of ground water for mining purposes from approximately 75 pump-back wells, which intercept contaminated ground water. Shelley, Tr. Vol. 1, p. 52-54; Blandford, Tr. Vol 7, p. 1649, line 23 - pg. 1652, line 3;

c. Tyrone collectively withdraws approximately 60 acre-feet of ground water per year from two drinking water supply wells referred to as the "Fortuna Wells." Blandford, Tr. Vol. 7, p. 1763, lines 18-25.

88. A place of withdrawal of water may be the aquifer or portions of the aquifer. Gutiérrez, Tr. Vol. 4, p. 1039, line 9 to p. 1040, line 6; Olson, Tr. Vol. 8, p. 2004, lines 13-19.

89. The aquifer and the ground water underlying the surface is the place of withdrawal of water. The place of withdrawal does not have to be on the surface.

Menetrey, Tr. Vol. 10, p. 2487, lines 8-13; Tr. Vol. 11, p. 2753, lines 5-13; Olson, Tr. Vol. 7, p. 1865, line 23.

90. Tyrone called on Dr. John W. Shomaker, a consulting hydrogeologist, to assist the Commission in identifying an appropriate place or places of "withdrawal of water for present or reasonably foreseeable future use," as the phrase is used in NMSA 1978, § 74-6-5(E)(3), and in relation to the Tyrone Mine site. Tyrone Exhibit 907; Shomaker, Tr. Vol. 6, pp. 1469-1472.

91. Dr. Shomaker testified that identification of places of withdrawal of water for present or reasonably foreseeable future use is dependent on a number of factors, including the location of existing wells and water uses; land ownership, control and uses; population and related existing and projected demands on water resources; the physical places where developable water is located; the geological site conditions and hydraulic conductivity of the particular aquifer; and the depth to the water table and quality of the ground water; administrative constraints on water rights and uses; and the relative ease or difficulty of putting wells at given locations, taking into account mine disturbances, ground slope, and so forth. Shomaker, Tr. Vol. 6, p. 1472, lines 2-15.

92. A "place of withdrawal of water" refers to <u>any</u> area where the hydraulic conductivity of the underlying aquifer is at least 0.05 ft/day and is capable of producing water in sufficient amounts to support beneficial use. A place of withdrawal need not be a drilled well. Shomaker, Tr. Vol. 6, pg. 1479, line 19 to pg. 1480, line 5; p. 1491, line 24 to p. 1492, line 5; Tyrone Exhibit 907, Figs. 9 and 10.

93. Dr. Shomaker prepared a report for this hearing titled <u>Place of Withdrawal of Water for Present or Reasonably Foreseeable Future Use Near Phelps Dodge Tyrone,</u>

Inc. Operations, Grant County, New Mexico, dated July 2007. Tyrone Exhibit 907, Att. 2; Shomaker, Tr. Vol. p. 1475, line 24 to p. 1480, line 5.

94. Dr. Shomaker's report includes maps identified as Figures 1 through 10. The study area shown on each of the maps is about 294 square miles within Grant County and is roughly described as lying between Silver City on the north, White Signal on the south, San Vicente Arroyo on the east, and extending about eight miles west from the Tyrone main pit area. The MMD Permit Boundary is outlined on each of the maps. Tyrone Exhibit 907, Att. 2 and Figs. 1-10.

95. Figure 4 is a geologic map taken from published sources that shows the outcrop areas of the various geologic units that are exposed at the surface of the study area. Generally, Quartz Monzonite, Andesitic Volcanics, Paleogene and Upper Cretaceous Intrusive Rocks, Upper Oligocene, Lower Oligocene Silicic Pyroclastic Rocks, Lower Tertiary Volcaniclastic Units, Precambrian Rocks, and Beartooth Quartzite geologic units, depicted in pink, brown, and green on the map, have much lower transmissivity than the Gila Conglomerate geologic units, depicted in yellow. Tyrone, Exhibit 907, Fig. 4; Shomaker, Tr. Vol. 6, p. 1478, lines 15-18; p. 1508, lines 13 –25.

96. Figures 5 and 6 indicate the average hydraulic conductivity of the upper and lower parts of the aquifer system in the study area. Each cell in the upper part of the aquifer is nominally 200 feet deep; each cell in the lower part of the aquifer is nominally 500 feet deep. The hydraulic conductivity values were derived from calibration of ground water flow models. Tyrone, Exhibit 907, Figs. 5 and 6; Shomaker, Tr. Vol. 6, p. 1583, line 5 to p. 1585, line 25.

97. Hydraulic conductivity is the rate at which water will pass through a unit cross-section of the aquifer under a unit hydraulic gradient. In simple terms, it is a measure of the permeability of the material. Tyrone, Exhibit 907, Figs. 5 and 6; Shomaker, Tr. Vol. 6, p. 1478, line 23 to p. 1479, line 7; p. 1582, lines 5-21.

98. The large white areas on Figures 5 and 6 are areas where there is no hydraulic conductivity information and areas, for example, in the case of the Mimbres Basin model, where the hydraulic conductivity is so low that the authors of the model felt that the area need not be included in the regional model. Tyrone, Exhibit 907, Figs. 5 and 6; Shomaker, Tr. Vol. 6, p. 1586, lines 4-22.

99. Figure 7 is a map that depicts the water flow in the regional aquifer and generalized elevation contours on the water table taken from Trauger (1972) and lines separating areas in which the ground water head in the aquifers is higher than it is within the MMD Permit Boundary from those that lie down-gradient from the area within the MMD Permit Boundary. The map represents a contouring of essentially all the data for water levels in wells and some springs. Tyrone, Exhibit 907, Fig. 7; Shomaker, Tr. Vol. 6, p. 1479, lines 10-16; p. 1582, lines 5-21.

100. The brown line running northwest to southeast on Figure 7 is functionally coincident with the Mangas Fault, a significant fault that bounds the Burro Mountains on their southwest side. The fault marks a discontinuity in the water table in the area of the MMD Permit Boundary because it separates relatively low permeability rocks, indicated by the pink, green, and brown colors, from the relatively high hydraulic conductivity materials, which in most cases is the Gila Conglomerate, indicated by the

yellow color. Shomaker, Tr. Vol. 6, p. 1507 line 6 to p. 1508, line 6; p. 1512, line 5 to p. 1513, line 1. Tyrone Exhibits, 907, Figs. 4 and 7.

101. Figure 8 shows areas with slopes that are 25 percent or steeper within the study area. Tyrone Exhibit 907, Att. 2 at 9, Fig. 8.

102. Figure 9 shows areas of withdrawal of water and potential withdrawal of water for domestic and livestock use contiguous to and surrounding the MMD Permit Boundary. Tyrone Exhibit 907, Fig. 9.

103. The purple crosshatch pattern depicted on Figure 9 highlights areas in which wells already exist and areas where the average hydraulic conductivity of a significant part of the aquifer exceeds 0.05 ft/day, sufficient to support Section 74-12-1 domestic or livestock wells, capable of producing water up to three acre-feet per year, where slopes are less than 25%, and where leach piles, waste rock piles, and pits related to mining are absent. Tyrone Exhibit 907, Fig. 9; Shomaker, Tr. Vol. 6, pg. 1481, lines 10-20.

104. Although the purple crosshatch pattern depicted on Figure 9 excludes areas with 25 percent slopes, domestic wells can be drilled in areas with 25 percent or steeper slopes. Shomaker, Tr. Vol. 6, pg. 1590, line 11 to p. 1591, line 25; Tyrone Exhibit 907, Att. 2 at 9.

105. Figure 10 depicts areas of withdrawal of water contiguous to and surrounding the MMD Permit Boundary. The purple crosshatch pattern depicted in Figure 10 highlights areas in which the hydraulic conductivity of a significant thickness of the aquifer is one-foot per day or more, sufficient to support larger capacity wells suitable for clusters of single-family dwellings or small subdivisions, or suitable for larger subdivisions and, in some places, public water supply systems for present or reasonably foreseeable future

use. Tyrone Exhibit 907, Fig. 10; Shomaker, Tr. Vol. 6, pg. 1481, line 21 to pg. 1482, line 3.

106. Dr. Shomaker agreed that Figures 9 and 10 are based on the physical features of the aquifer and "drill-ability" and other more or less constant hydrogeological factors that do not change with time. Shomaker, Tr. Vol. 6, p. 1602, line 22 to p. 1603, line 13.

107. Actual well yields would depend on both the hydraulic conductivity and the thickness of the saturated aquifer material. Shomaker, Tr. Vol. 6, p. 1482, lines 6-9; p. 1485, lines 19-24.

108. There could be larger yields from wells developed in the Gila Conglomerate than from wells developed in less permeable strata. Blandford, Tr. Vol. 7, p. 1748, lines 20-21.

109. Figures 4, 5, 6, 7, 8, 9, and 10 are restricted to "technical things relating to where people will drill wells that don't change much over time and a few things such as administrative constraints that do not appear on maps." Shomaker, Tr. Vol. 6, p. 1603, lines 4-21; Tyrone Exhibit 907, Att. 2 at 8.

110. Dr. Shomaker agreed that the conductivity data for the Tyrone Mine generally shows that the hydraulic conductivity in the aquifer beneath the mine site is high enough to support domestic wells. Shomaker, Tr. Vol. 6, p. 1586, line 25 to p. 1587, line 5.

111. Dr. Shomaker testified that the purple crosshatch pattern depicted on Figure 9 "depends on control of the property in the sense that the purple lines don't extend into the permit boundary area, but the title to the land is not a consideration in the placement

of the purple lines." Tyrone Exhibit 907, Fig. 9; Shomaker, Tr. Vol. 6, p. 1598, lines 3-10.

112. Even though Dr. Shomaker did not address the area within the MMD Permit Boundary, he agreed that the characteristics represented by the purple crosshatch pattern are found inside the MMD Permit Boundary. Shomaker, Tr. Vol. 6, p. 1599, lines 1-3.

113. Dr. Shomaker agreed that there are a number of locations within and around the MMD Permit Boundary where the hydraulic conductivity, slope, and absence of mining features are suitable to support Section 72-12-1 wells, but not great enough to support larger capacity wells. Dr. Shomaker also agreed that there are areas within the MMD Permit Boundary where the hydraulic conductivity is high enough to support larger capacity wells. Shomaker, Tr. Vol. 6, p. 1587, line 6 to p. 1589, line 3; p. 1598, line 4 to p. 1599, line 18.

114. Dr. Shomaker agreed that there are places within the MMD Permit Boundary where the purple crosshatch pattern illustrating areas capable of supporting Section 72-12-1 domestic wells and depicted on Figure 9 would extend and the criteria upon which the purple crosshatch pattern is based would apply. Tyrone Exhibit 907, Fig. 9; Shomaker, Tr. Vol. 6, p. 1598, line 13 to p. 1599, line 3.

115. The MMD Permit Boundary is not a physical barrier and the ground water underlying the area contained within the boundary is not physically unavailable for use, even though accessibility of the surface for drilling wells by parties other than the landowner may be limited or denied altogether. Ground water is still going to be produced and will not disappear or be left untouched and untouchable because of the closure plan. Shomaker, Tr. Vol. 6, p. 1568, lines 1-10.

116. Water tables and ground water flow fields are continuous across hydrogeologic units in the regional aquifer underlying the Tyrone Mine site. Blandford, Tr. Vol. 7, p. 1729, line 25 to p. 1730, line 15.

117. Ground water flows do not stop at permit boundaries or property boundaries. Gutiérrez, Tr. Vol. 5, p. 1043, lines 7-10.

118. No hydrologic or hydrogeologic basis was offered for selecting the MMD Permit Boundary as the dividing line between places where withdrawal of ground water is foreseeable and places where it is not; the MMD Permit Boundary was chosen as a "convenience." Blandford, Tr. Vol. 6, p. 1670, lines 1-2.

119. Tyrone does not dispute that the Fortuna Wells, located inside the MMD Permit Boundary, are a place of withdrawal of water. Shelley, Tr. Vol 1, pgs. 56-57, lines 24-4; Mohr, Tr. Vol. 1, pg. 296, lines 5-10; Tyrone Exhibit 901 at 10.

120. Tyrone does not dispute that lands owned by third parties within the MMD Permit Boundary and all of the area immediately outside and surrounding the MMD Permit Boundary are "places of withdrawal of water for present or reasonably foreseeable future use" within the meaning of NMSA 1978, § 74-6-5(E)(3) ("Place of Withdrawal"). Tyrone does not dispute that water quality standards must be met in ground water at and outside the MMD Permit Boundary. Tr. Vol. 1-24.

121. Cory Dalton, Tyrone's drilling expert, testified that he had drilled many wells, up to 500 feet deep, through stockpiles and open pits at the Tyrone and Chino Mines. Mr. Dalton identified places throughout the Tyrone Mine site where drilling wells, although costly, would be technically feasible. Dalton, Tr. Vol. 20, p. 4973, line 24 to p. 4976, line 20; p. 4963, line 16 to p. 4971, line 20.

122. Neil Blandford, Tyrone's hydrogeologist, testified that there are several locations around the Tyrone Mine along the MMD Permit Boundary that could be places of foreseeable future use of water. Tyrone Exhibit 905 at 12-13; Blandford, Tr. Vol. 6, p. 1666, line 8 to p. 1667, line 23.

123. Mr. Blandford described several locations to the northwest of the mine in the Mangas Valley, to the southeast of the mine in the vicinity of Oak Grove Wash, and to the west of the mine on property owned by the federal Bureau of Land Management, that need to be monitored as potential places of withdrawal. Tyrone Exhibit 905 at 13; Blandford, Tr. Vol. 6, p. 1666, lines 21-24.

124. Clint Marshall testified that there are many locations throughout the mine site, inside the MMD Permit Boundary, where domestic or agricultural supply wells could be located. He identified several examples of such locations. Marshall Vol. 13, p. 3292, lines 1-6; p. 3292, line 25 to p. 3293, line 1.

125. Mr. Marshall identified the following areas as places of withdrawal of water where domestic or agricultural water supply wells could be located:

a. Areas on the north side of the mine around the Mangas Valley tailings impoundments. Marshall, Tr. Vol. 13, p. 3293, lines 11-17.

b. Areas to the west and to the east of the 1A Tailings Impoundment. Marshall, Tr. Vol. 13, p. 3294, lines 3-10.

c. An area immediately south of the 1A Tailings Impoundment. Marshall, Tr. Vol. 13, p. 3295, line 9.

d. An area to the southeast of the 3A Stockpile and to the east of the 3B Waste Rock Pile around the old mill site. Marshall, Tr. Vol. 13, p. 3296 to 3297, line 2.

e. Open areas around the pits. Marshall, Tr. Vol. 13, p. 3297, line 24 to p. 3298, line 1.

f. The area on the east side of the mine south of the 5A Waste Rock Pile, "which has fantastic views of the Savannah Pit." Marshall, Tr. Vol. 13, p. 3298, line 19 to 3299, line 8.

g. An area south of the Gettysburg Pit. Marshall, Tr. Vol. 13, p. 3299, lines 9-18.

h. Areas on the southwest corner of the mine. Marshall, Tr. Vol. 13, p. 3302, lines 19-24.

i. An area to the west of the Gettysburg Pit, along the 1C Stockpile. Marshall, Tr. Vol. 13, p. 3300, lines 9-15.

j. Areas on the southeast side of the mine along and within Oak Grove Draw. Marshall, Tr. Vol. 13, p. 3302, line 25 to p. 3303, line 15.

k. An area on the east side of the mine to the southeast of the No. 1 Stockpile. Marshall, Tr. Vol. 13, p. 3303, lines 9-15.

l. Areas in the southeast corner of the mine, around the reclaimed Burro Mountain Tailings. Marshall, Tr. Vol. 13, p. 3303, lines 16-24.

m. Areas on the west side of the mine in Deadman Canyon. Marshall, Tr. Vol. 13, p. 3304, lines 1-19.

126. Mr. Marshall testified that these potential locations for water supply wells exist within both the Gila-San Francisco Basin and the Mimbres Basin. Marshall, Tr. Vol. 13, p. 3311, lines 7-23.

Criteria Proposed by the Parties for Identifying Any Place of Withdrawal of Water for Present or Reasonably Foreseeable Future Use

127. NMED's first proposed criterion is site hydrology and geology. This criterion addresses hydrologic and geologic properties and settings of the place where the discharge occurs. NMED Exhibit 1 at 5.

128. Site hydrology includes the properties and extent of different water-bearing formations, or aquifers, existing in the vicinity of the site, and their relationship. Hydrology also includes the different ground water basins at the site and in the area. Site hydrology also includes the quantity of water that can be pumped from a well at the site; the depth to water table; the direction of ground water flow; the rates of groundwater flow; and the recharge of the ground water aquifer. The geology of a site includes the rock and sediment type and water bearing formations, including physical properties that affect the ability of a formation to be utilized as a source of water, such as porosity and the extent and degree of fracturing. Geology can affect the quality of water, the rate at which it can be pumped, and the rate of recharge of the aquifer, among other things. NMED Exhibit 1 at 6; Olson, Tr. Vol. 7, p. 1877, lines 4-14.

129. NMED's second proposed criterion is quality of the ground water prior to any discharge from the facility. This criterion addresses the chemical and physical properties of the ground water. It includes a determination whether the ground water contains greater than 10,000 mg/l TDS. If it does, it is not subject to protection or

abatement under the WQCC regulations. See 20.6.3109.C(2); 20.6.2.4103.B NMAC. This criterion also includes a review of other water quality standards. NMED Exhibit 1 at 7-8; Olson, Tr. Vol. 7, p. 1877, line 17 to p. 1878, line 23.

130. NMED's third proposed criterion is the past and current land use in the vicinity of the facility. The past and current land use gives an indication of present water use and potential future water use. NMED Exhibit 1 at 8; Olson, Tr. Vol. 7, p. 1878, line 24 to p. 1879, line 6.

131. NMED's fourth proposed criterion is potential future land use in the vicinity of the facility. Future land use indicates the likelihood of future water use and future demand for ground water. NMED Exhibit 1 at 8; Olson, Tr. Vol. 7, p. 1879, lines 7-23.

132. NMED's fifth proposed criterion is past and current water use in the vicinity of the facility. Past water use gives an indication of likely future water uses. Present water use indicates current places of withdrawal of water for domestic and agricultural water use. NMED Exhibit 1 at 9; Olson, Tr. Vol. 7, p. 1879, line 24 to p. 1880, line 6.

133. NMED's sixth proposed criterion is the potential future water use in the vicinity of the facility. Potential future water use is an indicator of places of withdrawal for foreseeable future use. It also is an indicator of the demand that may be placed on existing water supplies. NMED Exhibit 1 at 9; Olson, Tr. Vol. 7, p. 1880, lines 7-18.

134. NMED's seventh proposed criterion is population trends in the vicinity of the facility. The population trend in the vicinity is indicative of foreseeable future demands on area water supplies and the likely need for sources of water to supply population demands. NMED Exhibit 1 at 9-10; Olson, Tr. Vol. 7, p. 1880, line 18 to p. 1881, line 1.

135. Tyrone submitted several proposed factors and policies for the Commission's consideration in interpreting and applying the phrase "place of withdrawal for present or reasonably foreseeable future use" for the purpose of measuring a discharge's effects in the closure context. Tyrone Exhibit 911.

136. Tyrone's proposed factors are: nature, extent, and history of permitted activities at the site to be closed; land uses in the vicinity of the site to be closed and the site's proximity to established communities and their water supplies; land ownership status of the site to be closed and the surrounding area; owner imposed institutional controls on future uses of the site to be closed; zoning requirements or restrictions applicable to the site and surrounding areas; site specific plans and comprehensive regional plans as they effect the foreseeable future uses of the site and surrounding areas; demographic projections of population growth or decline in the general area; site features and any closure/closeout permit conditions dictating site-related obligations protective of groundwater; past and current uses of ground water at the site and its surrounding areas; hydrogeology and direction of ground water flow in the specific and general area; practicability of developing ground water in the area, including consideration of supply and demand, economic factors and technical feasibility; legal and administrative constraints on future use of ground water in the area; accepted land use and water planning horizons; and whether new water development is reasonably foreseeable or merely "possible." Tyrone Exhibit 911.

137. Tyrone's first proposed policy is the Water Quality Act's dual policy of protecting good quality water for reasonably foreseeable future use while promoting

responsible utilization of such ground water for industrial, mining, agricultural, wildlife, and other uses. Tyrone Exhibit 911.

138. Tyrone's second proposed policy is the Court of Appeal's recognition of the need for a balanced, practical, and sensible approach to the Water Quality Act, including the Court's recognition that mining is an essential activity in the State of New Mexico. Tyrone Exhibit 911.

139. Tyrone's third proposed policy is the overall need for fairness and consistency in the interpretation and application of the language in question given the historic development, interpretation, and implementation of the Water Quality Act and regulations adopted thereunder. Tyrone Exhibit 911.

140. Tyrone's fourth proposed policy is the encouragement of scientifically sound closure practices that are both technically feasible and economically achievable (using a cost benefit analysis), and that take reasonable advantage of any site-specific conditions and the collective wisdom of scientific and regulatory communities. Tyrone Exhibit 911.

141. GRIP submitted three proposed factors or criteria for the Commission's consideration in determining a discharge's effect in any place of withdrawal for present or reasonably foreseeable future use: site hydrology and geology; quality of ground water prior to any discharge from the Tyrone facility; and current and future value of ground water in the vicinity of the facility to the residents of New Mexico. See Gila Resources Information Project's List of Proposed Factors or Criteria dated March 23, 2008.

Site Hydrology and Geology

142. The Tyrone Mine site is set in the Basin and Range physiographic province, within a complex hydrogeologic system. It straddles the Continental Divide between the Big Burro Mountains and the Little Burro Mountains. The Continental Divide tracks southwest-northeast through the center of the Tyrone Mine, roughly defining the boundary between the Gila-San Francisco ground water basin and Mimbres ground water basin, as declared by the New Mexico State Engineer. NMED Exhibit 15 at 3-6.

143. The Tyrone Mine is located within a porphyry copper deposit at the southeast end of the Big Burro Mountains. NMED Exhibit 15 at 3.

144. The Big Burro Mountains are dominantly composed of the Tertiary Quartz Monzonite. This batholith was subsequently intruded by the Tyrone stock nearly 56 million years ago. The Tyrone laccoliths are composed of Tertiary quartz monzonite formed during four stages of porphyry intrusion. NMED Exhibit 15 at 4; NMED Exhibit 17.

145. Cretaceous rocks are present in the Little Burro Mountains and consist of predominantly sedimentary units including the Beartooth Quartzite and the Colorado formation. Cretaceous and Tertiary volcanic rocks, primarily andesites and rhyolites, overlie the Cretaceous sedimentary units. NMED Exhibit 15 at 4; NMED Exhibit 17.

146. The youngest rocks in the area are of the late Tertiary and Quarternary age and consist mostly of sands, gravels and conglomerates. The Gila Conglomerate, the oldest of the younger sedimentary rocks, is a semi-consolidated unit that was deposited as bolson fill and fan sediments from later Tertiary and earlier uplifts. NMED Exhibit 15 at 4; NMED Exhibit 17.

147. The youngest of the sedimentary units is Quaternary alluvium, consisting of unconsolidated valley fill that was deposited unconformably on Gila Conglomerate. It exists along present-day drainages in alluvial deposits. NMED Exhibit 15 at 4; NMED Exhibit 17.

148. In general, the beds mapped as alluvium and Gila Group are composed of sand, gravel, silt, and clay and have relatively high conductivity, capable of supporting the highest well-yields, whereas the outcrops shown as Precambrian are of crystalline igneous and metamorphic rocks with very low conductivity. Tyrone Exhibit 907, Attachment 2 at 6 and Figure 4.

149. The Tyrone Mine area contains portions of two ephemeral watercourses, Mangas Wash and Oak Grove Draw, and five tributary watersheds, Wind Canyon, Red Rock Canyon, Niagara Gulch, Deadman Canyon, and Brick Kiln Gulch. NMED Exhibit 15 at 5; NMED Exhibit 18.

150. Regionally, ground water moves either toward the northwest into the Gila-San Francisco ground water basin or toward the southeast into the Mimbres ground water basin. NMED Exhibit 15 at 6.

151. The Mangas Wash within the Gila-San Francisco Basin extends northwestward from the northern boundary of the Mining Area through the Mangas Valley Tailings Area. Several smaller watersheds drain into Mangas Wash from the northeast and southwest. NMED Exhibit 15 at 5; NMED Exhibit 18.

152. Oak Grove Draw flows east within the Mimbres Basin along the southern perimeter of the Mining Area. NMED Exhibit 15 at 5; NMED Exhibit 18.

153. Brick Kiln Gulch extends from the No. 1B Leach Ore Stockpile and merges with Oak Grove Draw within the Mimbres Basin one mile east of the mine site. NMED Exhibit 15 at 5; NMED Exhibit 18.

154. There are several springs on the mine site in Deadman Canyon within the Gila-San Francisco Basin that produce surface flows over short distances. NMED Exhibit 15 at 5.

155. The pumping of the Main Pit and Gettysburg Pit at the Tyrone Mine Site has lowered the ground water levels and induced ground water flow toward the open pits at the mine. NMED Exhibit 15 at 6.

156. Pumping of the pits in the Central Mining Area induces a capture zone within the regional aquifer that extends beneath a large portion of the MMD Permit Boundary. This capture zone would not occur naturally and would not continue to exist but for the pumping and withdrawal of water from the open pits. Shelley, Tr. Vol. 1, p. 51, lines 19-24; Blandford, Tr. Vol. 7, p. 1798, line 5 to p. 1799, line 23; Tyrone Exhibit 905, Att. 3. (Blandford-4).

157. Two separate but hydraulically connected aquifer systems, the regional aquifer and the alluvial aquifer, exist in the area within and surrounding the Tyrone Mine. NMED Exhibit 15 at 6.

158. The regional aquifer is the primary source of water for domestic and agricultural use in the region. NMED Exhibit 15 at 6.

159. The regional aquifer extends across the Continental Divide and exists on both sides of the Divide, in the Gila-San Francisco Basin and the Mimbres Basin. NMED Exhibit 15 at 6.

160. Characteristics of the regional aquifer differ somewhat in the Central Mining Area, which encompasses both the Gila-San Francisco Basin and the Mimbres Basin, and the Mangas Valley Tailings Area, which exists mostly in the Gila-San Francisco Basin. NMED Exhibit 15 at 6-7.

161. Water-bearing units of the regional aquifer in the Central Mining Area include the Gila conglomerate and the fractured igneous rocks of the Burro Mountain granite and Tertiary quartz monzonite. NMED Exhibit 15 at 7.

162. Water-bearing units of the regional aquifer in the Mangas Valley include Tertiary Gila conglomerate over much of the area and Quaternary alluvium along the major axis of the Mangas Valley. NMED Exhibit 15 at 6.

163. The depth to regional ground water in the Central Mining Area ranges from approximately one foot at the bottom of the Main and Gettysburg Pits to more than 500 feet east of the mine. NMED Exhibit 15 at 7.

164. The depth to regional ground water in the Mangas Valley ranges from approximately 40 feet to nearly 90 feet below ground surface. NMED Exhibit 15 at 6-7.

165. Significant recharge of the regional aquifer occurs in the Big Burro Mountains located on the southwest border of the Tyrone Mine. NMED Exhibit 15 at 8, Marshall, Tr. Vol. 11, p. 2932, lines 22-25.

166. The Big Burro Mountains are a recharge area for the mine site. Blandford, Tr. Vol. 18, p. 4358, lines 16-23.

167. The ground water entering the southwest side of the mine site from the Big Burro Mountains is of good quality. NMED Exhibit 15 at 8, Marshall, Tr. Vol. 11, p. 2935, lines 23-25.

168. Hydraulic conductivity in the regional aquifer in the Central Mining Area is strongly influenced by fractures in the bedrock units and is therefore highly variable. Fractured zones within the igneous formations can produce significant amounts of water. NMED Exhibit 15 at 6; Shomaker, Tr. Vol. 6, p. 1554, lines 20-24.

169. The alluvial aquifer has supplied domestic water in the past. Presently, the alluvial aquifer is used mostly for livestock watering. NMED Exhibit 15 at 7.

170. This alluvial aquifer system is located at the base of the alluvium-filled channels that have been eroded in the igneous bedrock or the Gila conglomerate around the Central Mining Area. These channels generally follow ephemeral stream drainages at the Tyrone Mine Facility. NMED Exhibit 15 at 6-7; NMED Exhibit 17.

171. The depth to the alluvial ground water generally ranges from 10 to 50 feet below ground surface. NMED Exhibit 15 at 6-7.

172. The hydraulic conductivity of the alluvial aquifer is adequate to support wells. Marshall, Tr. Vol. 11, p. 2965, lines 3-7; p. 2927, line 22 to p. 2928, line 23.

173. Pumping of the pits within the Tyrone Mine Site that affects the regional ground water table does not affect ground water flow in the shallow alluvial aquifers. Marshall, Tr. Vol. 11, p. 2932, lines 21-25.

174. Leaching operations and acid rock drainage migrating downward through leach ore stockpiles, as well as through unleached waste rock piles contaminate the ground water as it moves from the Big Burro Mountains into the Central Mining Area. NMED

Exhibit 15 at 8, Marshall, Tr. Vol. 11, p. 2932, line 23 –p. 2936, line 10, p. 2940, lines 1-15; AR 1341 A-286 at p. 7.

175. Ground water is not static but moves within an aquifer in the direction of the ground water gradient. Menetrey, Tr. Vol. 11, p. 5-16; Marshall, Tr. Vol. 13, p. 3260, lines 18-24; Tyrone Exhibit 900 at 6-7, Attachment 2.

176. The Tyrone Mine Site contains numerous faults and fractures that affect the flow of ground water in the aquifers in unpredictable ways. The mining activities at Tyrone have affected this hydrogeologic system in ways that are still poorly understood. NMED Exhibit 15 at 5-6.

177. The mine site is bounded by the Burro Chief and West Main fault systems on the west, the Sprouse-Copeland Fault on the east, the San Salvador fault systems on the south, and the Mangas Fault to the north. The Mining area contains numerous smaller faults. NMED Exhibit 15 at 3-4; NMED Exhibit 17.

178. Local faulting substantially affects ground water levels in the regional aquifer in some areas. Depth to water increases by several hundred feet as one moves eastward across the Sprouse-Copeland Fault and as one crosses the Mangas Fault from north to south. NMED Exhibit 15 at 6-7.

179. The bedrock in the Mining area is highly fractured in places. NMED Exhibit 15 at 4.

180. The frequency of fractures is greater toward the faults and least away from the faults. Shomaker, Tr. Vol. 6, p. 1540, lines 3-6.

181. Open fractures act as conduits for ground water and fractures filled with minerals or precipitates from hydrothermal fluids may act as barriers to ground water. Shomaker, Tr. Vol. 6, p. 1578, lines 4-7.

182. Where open fractures are present, the ground water flow would increase because the fractures enhance the permeability of the material. Shomaker, Tr. Vol. 6, p. 1540, lines 11-14.

183. The ground water is continuous between the Gila Group and Lower Tertiary and Precambrian units, across even the Mangas Fault. Shomaker, Tr. Vol. 6, p. 1529, line 13 to p. 1530, line 1.

184. Where fracturing has occurred, the properties of the anisotropic materials would make the ground water flow greater in one direction through the aquifer than in the direction normal to that. Shomaker, Tr. Vol. 6, p. 1541, lines 5-24.

185. The ground water flow preferentially will follow the fractures, generally in the direction of the head gradient. Shomaker, Tr. Vol. 6, p. 1542, line 12 to p. 1543, line 21.

<u>Ground Water Quality Prior to Any Discharge from the Facility</u>

186. Trauger (1972) established that ground water was "good" in the mine area "except possibly in the more highly mineralized zones where the pit will be opened." NMED Exhibit 20 at 83 and Table 14.

187. Analyses of ground water samples taken from the regional aquifer in 1981 indicated concentrations of TDS at approximately 200 to 300 mg/L and concentrations of sulfate at 20 to 100 mg/L. NMED Exhibit 15 at 9; AR 166 A-12.

188. Analyses of ground water samples taken from the alluvial aquifer in 1981 indicated concentrations of TDS at approximately 210 to 380 mg/L and concentrations of sulfate at 30 to 100 mg/L. NMED Exhibit 15 at 9; AR 166 A-36.

189. Data from a Phelps Dodge Corporation well in Deadman Canyon in 1970 showed concentrations of TDS at approximately 242 mg/L and concentrations of sulfate at 13 mg/L. Comm'n Hr'g (2003) Marshall Test. Tr. Vol. 5, P. 1232, Lines 8-13; AR-166 A-14.

190. In 1970, data from the Fortuna Well No. 1, which supplied potable water to the Tyrone Mine, showed TDS concentrations of 240 mg/L and sulfate concentrations of 18 mg/L. AR-166 A-14.

191. Data from the Oak Grove Ranch well in 1975 showed TDS concentrations of 394 mg/L and sulfate concentrations of 165 mg/L. Comm'n Hr'g (2003) Marshall Test. Tr. Vol. 5, P. 1231, line 24 to p, 1232, line 4; AR-166 A-14.

192. The present WQCC ground water standard for TDS is 1,000 mg/L and the present WQCC ground water standards for sulfate is 600 mg/L. 20.6.2.3103.B NMAC.

<u>Past and Current Land Use</u>

193. Past and current land use in the vicinity of the Tyrone Mine includes industrial use within the MMD Permit Boundary and agricultural and residential uses outside the MMD Permit Boundary. NMED Exhibit 1 at 18.

194. Industrial land use has taken place on the mine property for decades. AR 1341 C-39 at § 2.3.

195. Grazing is the current primary use of the private, federal and state lands located within one mile outside of the MMD Permit Boundary. Phelps Dodge leases some of

its own land holdings for grazing just east of the mine stockpile area down the Mangas Wash near the tailing area. Tyrone Exhibit 900 at 12; Shelley, Tr. Vol. 1, p. 58, lines 15-20.

196. There are recreational uses allowed on federal lands within one mile of the MMD Permit Boundary, particularly on U.S. Forest Service land. Shelley, Tr. Vol. 1, p. 58, lines 17-20.

197. There are two residences associated with the lands leased by Phelps Dodge for grazing within one mile of the MMD Permit Boundary. Tyrone Exhibit 900 at 12; Shelley, Tr. Vol. 1, p. 58, lines 21-23.

198. These industrial, agricultural, and residential land uses all require a water supply. NMED Exhibit 1 at 8.

199. There are no residences located on lands owned by third parties within one mile of the MMD Permit Boundary. Shelley, Tr. Vol. 1, p. 60, lines 2-5.

200. An eight-acre parcel, located in Section 13 to the northeast side of the MMD Permit Boundary, is privately owned and has not been disturbed by mining. Shelley, Tr. Vol. 1, p. 59, lines 2-20.

201. The Bureau of Land Management (BLM) owns four small parcels on the west side of the mine near Deadman Canyon. These parcels are located within the MMD Permit Boundary. Shelley, Tr. Vol. 1, p. 61, lines 10-15, p. 62, lines 3-6, p. 103, lines 14-16; Tyrone Exhibit 910.

202. The U. S. Forest Service owns land located outside the MMD permit Boundary on the southwest side of the mine. Shelley, Tr. Vol. 1, p. 62, lines 3-6; Tyrone Exhibit 910.

203. There are several residential communities within five miles outside the MMD Permit Boundary. South of the Tyrone Mine there are five small subdivisions on Highway 90. To the southwest of the mine there is a small subdivision called Burro Mountain Homestead. A subdivision called Red Rock is directly west of the Tyrone Mine. Wind Canyon Estates is a subdivision located five miles north of the mine's tailing area. The Tyrone Townsite is located five miles northeast of the mining area. Tyrone Exhibit 900 at 12; Shelley, Tr. Vol. 1, p. 61, lines 5-9.

204. The Burro Mountain Homestead has a well and a water users association. The Tyrone Townsite has a public water system. Shelley, Tr. Vol. 1, p. 85, lines 16-19, and p. 86, lines 1-3.

<u>Potential Future Land Use</u>

205. Tyrone estimates that active mining will continue at Tyrone for another 20 years. After active mining stops, Tyrone will continue to operate the SX/EW plant for 5 to 20 years after that. <u>See</u> Mohr, Tr. Vol. 2, p. 288 line 25 to p. 289, line 21; Tr. Vol 22, p. 5534, lines 13-20.

206. The designated post-mining land use for the Tyrone Mine, approved by MMD pursuant to the New Mexico Mining Act, NMSA 1978, Section 69-36-7(H)(4), is industrial and wildlife habitat. NMED Exhibit 36 at 7; Brancard, Tr. Vol. 17, p. 4197, line 20 to p. 4208, line 23.

207. If a mine operator wishes to designate all or a portion of a mine site for a land-use other than self-sustaining ecosystem, the mine operator may request authorization from MMD to do so. For MMD to authorize an industrial post-mining land use, the mine operator must justify that an industrial use is possible and foreseeable for the mine

site and that each structure to be retained can be used for industrial purposes. NMED Exhibit 36 at 3-4.

208. Once a post-mining determination is made, it may be changed to fit the changing circumstances of the mine site. NMED Exhibit 36 at 7.

209. MMD approval of an industrial post-mining land use at a mine site does not preclude the later use of that same land for residential use. Brancard, Tr. Vol. 17, p. 4246, lines 8-17.

210. To obtain MMD approval of industrial post-mining land use for a mine site or any portion of a mine site, mine operators must demonstrate that the mine site or certain portions of the mine site will be used as an industrial site upon closure. Because MMD waives financial assurance for those portions, the State must have a high degree of certainty that the identified portions of the mine site will be used immediately upon closure for industrial purposes without substantial expenditure of funds. NMED Exhibit 36 at 4; Brancard, Tr. Vol. 17, p. 4199, line 3 to 4200, line 23.

211. MMD has approved an industrial post-mining land use for approximately 50 acres of surface land within the MMD Permit Boundary. To date, MMD has approved the use of 23 buildings and facilities at the Tyrone Mine for industrial use upon closure. Tyrone had originally requested approval for 46 buildings and structures. See Tyrone Closure Plan, §§ 3.G and 9.1.1, App. & Figures 2-9, SWEX & 2-11; NMED Exhibit 36 at 5-6; Brancard, Tr. Vol. 17, p. 4198, line 7 to p. 4199, line 2 and p. 4204, lines 9-11; Mohr, Tr. Vol. 2, p. 400, lines 8-12.

212. To obtain MMD approval of industrial post-mining land use for its 50-acre industrial site, MMD asked Tyrone to provide information on the existing structures,

including use justification, structure dimensions and contents, drawings and design specifications detailing how each area will be reclaimed and the industrial post-mining land use established, documentation of compliance with local zoning ordinances and building codes, and a building inspector's certification of good condition. Tyrone also is required under its Closeout Plan to ensure that there is sufficient water for the proposed industrial operations after mine closure. NMED Exhibit 39, letter from F. Martinez, MMD, to J. Brunner, Tyrone, dated 10/02/02, p. 3; Brancard, Tr. Vol. 17, p. 4202, line 15 to p. 4203, line 6.

213. In support of its request for approval of industrial post-mining land use designation for its 50-acre site, Tyrone represented to MMD that it has "adequate water rights to support industrial uses." Tyrone stated that its "Annual State Limit water right is 9,400 acre-feet." NMED Exhibit 40, letter from J. Brunner, Tyrone, to Karen Garcia, MMD, dated 01/22/03, p. 9; NMED Exhibit 36 at 6; Brancard, Tr. Vol. 17, p. 4206, line 10 to p. 4207, line 1.

214. In making its determination for post-mining land use, MMD also considered the existence of a railroad spur, an on-site supply of electrical power, and the proximity of Route 90 to the 50-acre industrial site. Brancard, Tr. Vol. 17, p. 4207, lines 13-24.

215. Tyrone would not be able to demonstrate available water supply through supplying bottled water. Brancard, Tr. Vol. 17, p. 4207, lines 2-9.

216. Tyrone also submitted an appraisal of the mine areas proposed for industrial use from a professional appraiser who stated that, "it is my opinion that these facilities have post-mining industrial use. As is they have value in use and likely could be leased to state, county, municipal or area business." NMED Exhibit 40 (attached letter from K.

Schrimsher Ranch Real Estate to Phelps Dodge Tyrone, Inc., dated 01/09/03); NMED Exhibit 36 at 7; Brancard, Tr. Vol. 17, p. 4205, lines 4-13.

217. Third parties could build residences on private land located within one mile of the MMD Permit Boundary. Shelley, Tr. Vol. 1, p. 62, lines 2-13, p. 69, line 20 to p. 70, line 14.

218. According to Thomas Shelley, in the coming decades Tyrone or its affiliated companies may lease or sell for development some of the private lands it owns outside the MMD Permit Boundary. Shelley, Tr. Vol. 1, p. 63, lines 10-13, p.62, lines 6-12.

219. Jon González, owner of the Schiff property, which is partially located within the MMD Permit Boundary, testified that he intends to develop the property and to drill a well on his land. González, Tr. Vol. 9, p. 2305, line 17 to p. 2306, line 7, p. 2306, lines 20-21; Tyrone Exhibit 910.

220. Many other closed hard rock mine sites in New Mexico have been developed for industrial, commercial or residential uses. NMED Exhibit 36 at 8-9; Brancard, Tr. Vol. 17, p. 4208, line 25 to p. 4211, line 10.

221. The Pinos Altos Mine in Grant County was an underground copper mine that is currently owned by Phelps Dodge and is currently designated as residential post-mining land use. The site has been completely reclaimed and is planned to have several home sites constructed on it. NMED Exhibit 36 at 8; Brancard, Tr. Vol. 17, p. 4209, lines 13-17; p. 4211, lines 11-16.

222. There are several other mine sites that have an MMD-approved industrial or commercial post-mining land use designation for all or a portion of the site, and therefore the sites will need water after closure. Both Chino Mine and Cobre Mine,

open pit copper mines in Grant County owned by Phelps Dodge subsidiaries, have an industrial/commercial post-mining land use for a portions of the mine sites. ASARCO Deming Mill in Luna County, Mt. Taylor Mine and Tinaja Pit Mine in Cibola County, and Velarde Mill in Rio Arriba County all have MMD-approved industrial/commercial post-mining land uses. NMED Exhibit 36 at 9; Brancard, Tr. Vol. 17, p. 4211, line 17 to p. 4213, lines 1.

Current Water Use

223. Tyrone currently withdraws ground water from a number of locations inside the MMD Permit Boundary. See FOF # 87.

224. Tyrone has about 700 wells inside the MMD Permit Boundary that are used for a variety of purposes, including ground water remediation and monitoring, freshwater supply, or mining uses. A majority of the wells are used for environmental sampling and to monitor ground water conditions as required by the terms of the discharge permits. Shelley, Tr. Vol. 1, pgs. 51, lines 12-14, and p. 52, lines 8-12; Blandford, Tr. Vol. 6, p. 1649, line 22 to p. 1650, line 13.

225. Currently, Tyrone withdraws ground water from the open pits – the Main Pit and Gettysburg Pit – and it uses this water for its leaching operations. Tyrone Exhibit 900 at 4; Shelley, Tr. Vol. 1, p. 48, lines 17-21; Mohr, Tr. Vol. 2, p. 307, lines 4-10.

226. Currently, Tyrone withdraws ground water from pump-back wells or interceptor wells. Most of the pump-back wells are concentrated in the area of the 3A Stockpile and in the Oak Grove area on the east side of the mine. Tyrone Exhibit 900 at 7; Shelley, Tr. Vol. 1, p. 52, lines 13-16; p. 52, line 25 to p. 53, line 3; see also AR 286 C-51; AR 363 B-96.

227. Tyrone also withdraws ground water from pump-back wells in Deadman Canyon and in the area of the 1X Tailings Impoundment. AR 166 B-108; AR 27 C-17.

228. The Fortuna Wells (Fortuna Well 1 and Fortuna Well 2), located within the MMD Permit Boundary, currently supply drinking water for the mine, and they have done so for about 35 years. Shelley, Tr. Vol. 1, pgs. 48, lines 21-23; Mohr, Tr. Vol. 22, pg. 5518, lines 2-7; Marshall, Tr. Vol. 11, p. 2960, lines 20-25, p. 2961, lines 15-19.

229. The Fortuna Wells serve about 450 people. NMED Exhibit 15 at 14; Marshall, Tr. Vol. 11, p. 2965, lines 21-24.

230. The ground water that Tyrone currently withdraws from the open pits, pump-back wells, and Fortuna Wells inside the MMD Permit Boundary is applied to various beneficial uses in accordance with New Mexico water law and Tyrone's water rights. Tyrone, Exhibit 900 at 4; Shelley, Tr. Vol. 1, p. 48, lines 10-23; p. 53, lines 16-22; p. 67, line 19 to p. 68, line 6; p. 73, lines 5-12; p. 76, lines 5-8; p. 131, line 8 to p. 132, line 21; Mohr, Tr. Vol 2, p. 287, line 21 to p. 288, line 21; p. 304, lines 7-9; p. 1610, lines 9-22

231. Tyrone does not dispute that there are locations outside the MMD Permit Boundary from which water will be withdrawn over the next 30 to 40 years. Tyrone Opening Statement, Vol. 1, p. 40; Tyrone Exhibit 901 at 8; Tyrone Exhibit 900 at 15; Shomaker, Tr. Vol. 6, p. 1479, line 19 to p. 1480, lines 5; Tyrone Exhibit 907, Figs. 9 and 10.

232. Wells within roughly one mile of the MMD Permit Boundary are generally either small-yield domestic or stock-watering wells, or environmental monitoring wells. Some wells other than monitoring wells may pre-date the declarations of parts of the

Gila-San Francisco Basin in 1960 or 1963, or the Mimbres Basin in 1970. Other wells have permits under NMSA 1978, Section 72-12-1 (which limits withdrawals to non-consumptive inside use in the Gila-San Francisco, or 3 ac-ft/yr in the Mimbres Basin), or conventional permits with diversions less than or equal to 3 ac-ft/yr. Tyrone Exhibit 907, Attachment 2, at 3.

233. In 1972, there were approximately 84 domestic and agricultural wells within a four-mile radius of the Tyrone Mine. NMED Exhibit 15 at 12; Marshall, Tr. Vol. 11, 2952, line 10 to p. 2955, line 17. NMED Exhibits 20 and 21.

234. In 2006, there were 349 domestic and agricultural wells within a four-mile radius of the Tyrone Mine, a fourfold increase in 35 years. NMED Exhibit 15 at 12-13; Marshall, Tr. Vol. 11, p. 2956, line 3 to p. 2959, line 21; NMED Exhibit 22.

Potential Future Use/Demand for Water

235. Tyrone's Annual State Limit water right is 9,400 acre-feet. NMED Exhibit 40 (Page 9, January 22, 2003 letter to MMD Bureau Chief Karen García from Joseph Brunner).

236. Tyrone's water use will change over time. When active mining ceases, Tyrone anticipates that there will be gradual decrease in the amount of ground water used at the mine site. Shelley, Tr. Vol. 1, p. 49, line 25 to p. 50, line 9.

237. Tyrone must continue to withdraw ground water from the open pits, the pump-back wells, and the interceptor wells inside the MMD Permit Boundary for at least 100 years, in order to treat ground water and prevent ground water contamination in excess of ground water standards from migrating offsite. Shelley, Vol. 1, p.50, line 10 to p. 51, line 4; p. 53, line 4 to p. 54, line 12; p. 56, lines 11-20; p. 64, lines 19-22, p. 73, line 5 to

p. 74, line 13, p. 136, lines 3-24; Mohr, Tr. Vol. 2, p. 308, lines, 14-23; p. 357, line 21 to p. 359, line 5; p. 390, lines 6-12; Blandford, Tr. Vol. 7, p. 1804, line 20 to p. 1805, line 6; p. 1818, line 11 to p. 1819, line 8.

238. After mining ceases, Tyrone will construct a water treatment plant and route all impacted water to the treatment plant in an effort to intercept, capture, pump, and treat contaminated water at the mine site. Significant amounts of water and associated water rights will be used in connection with operation of the water treatment facility, but it will be less than the amount Tyrone currently uses. The water treatment plant will operate as long as is necessary to ensure that the closure plan objectives are met. The open pits will be pumped indefinitely to maintain the hydraulic sink or capture zone. Shelley, Tr. Vol. 1, p. 50, line 1 to p. 51, line 18; p. 55, lines 5-12; p. 56, 11-20.

239. Upon closure of the mine, some of the 700 wells on the Tyrone Mine will be plugged and abandoned and some will continue in use. For example, some of the pump-back remediation wells used today as part of the process water will continue to collect impacted water and send it to the treatment plant after closure. Some of the monitoring wells also will still need to be used to assess the success of intercepting impacted groundwater. Shelley, Tr. Vol. 1, p. 54, lines 9-12, p. 53, lines 4-10 and lines 20-23.

240. DP-1341, Condition 36, requires that water must be treated to meet water quality standards in section 20.6.2.3101 NMAC. NMED Exhibit 3 at 19.

241. During closure activities, the mine will be using existing and monitoring wells to sample ground water quality. In addition, the mine will pump an array of existing interceptor wells constructed for abatement of pumped and regional ground water.

Tyrone will continue to dewater the pits and route that water to the treatment facility. Blandford, Tr. Vol. 6, p. 1653, lines 7-16.

242. After mining ceases, impacted ground water diverted to the water treatment facility will be treated to meet ground water quality or surface water quality standards. Tyrone's closure/closeout plan states that the treated water will be re-injected into the regional aquifer or used for drinking water or agriculture. Mohr, Tr. Vol. 2, p. 311, lines 15-20; NMED Exhibit 3 at 19; Shelley, Tr. Vol. 1, p. 113, line 17 to p. 114, line 2; p. 116, lines 2-10; AR 1341, C-40 Page 5-30.

243. In support of its request to MMD for approval of industrial post-mining land use, Tyrone represented to MMD:

> At closure, a portion of the water PDTI has a water right to will require treatment. The treatment of this water as a part of PDTI's operations during closure is a beneficial use. This treated water under the current CCP draft proposal presented at the DP-1341 NMED hearing will meet WQCC standards. The water that is the result of this process must be put to beneficial use. Industrial as well as domestic and agricultural uses are identified as beneficial uses for the PDTI's water rights.

See NMED Exhibit 40 (January 22, 2003 letter to MMD Bureau Chief Karen García from Joseph Brunner, p. 9).

244. After mining ceases, Tyrone will use its pump-back wells to pump impacted mine water for treatment from the open pits, including the Main, Gettysburg, and Copper Mountain Pits and possibly others. Tyrone will maintain and pump interceptor wells and trenches from the perimeter of the mine area including, for example, the East Side interceptor system and Deadman Canyon collection system. Shelley, Tr. Vol. 1, p. 53, lines 16 to p. 54, line 12; p. 55, lines 13-23.

245. After mining ceases, Tyrone intends to install new capture wells around the mine site where clean water is flowing toward the open pits. These capture wells will collect ground water before it becomes contaminated. Tyrone intends to apply the clean water it withdraws from the capture wells to beneficial use in accordance with its water rights. Shelley, Tr. Vol. 1, p. 56, lines 1-8; p. 109, lines 2-16; Mohr, Tr. Vol 2, p. 308, lines 12-18, p. 389, line 23 to p. 390, line 12; Tyrone Exhibit 900 at 7-8, Att. 2.

246. After mining ceases, Tyrone will use the Fortuna Wells as a source of potable water for future use. Shelley, Tr. Vol. 1, p. 56, line 21 to p. 57, line 4.

247. After closure, the Mimbres wells (located south of the MMD Permit Boundary) could be used to supply water for agricultural or livestock purposed on lands further south or east of the well location. Shelley, Tr. Vol. 1, p. 57, lines 16-18; Tyrone Exhibit 907, Fig. 2.

248. Water withdrawn through extraction at the open pits or capture systems, once treated, will be discharged. Blandford, Tr. Vol. 18, p. 4403, line 18 to p. 4404, line 2.

249. Mr. Mohr, Phelps Dodge Corporation's general manager for the Tyrone mining operations and for environmental affairs for all New Mexico operations, agreed that it is reasonably foreseeable that treated water would be used for domestic purposes, if it were treated for that purpose. Mohr, Tr. Vol. 2, p. 360, lines 4-6.

250. Mr. Mohr also agreed that it is reasonably foreseeable that treated water would be used for agricultural purposes, if it were treated for that purpose. Mohr, Tr. Vol. 2, p. 360, lines 7-9.

251. Tyrone's closure/closeout plan states that treated water will be re-injected into the regional aquifer or used for drinking water or agriculture. Shelley, Tr. Vol. 1, p. 113, line 17 to p. 114, line 2, p. 116, lines 2-10; AR 1341, C-40, Page 5-30.

252. Mr. Mohr testified that Tyrone's water rights have both an economic and strategic value. Once Tyrone stops leaching the stockpiles, sale or lease of Tyrone's excess water rights to Silver City and Grant County is a "good possibility." Eventually, all water rights not being used in connection with the operation of the water treatment plant would be leased or sold to third parties. Mohr, Tr. Vol. 2, p. 290, line 21 to p. 291, line 20; p. 294, lines 294, lines 2-5.

253. In the summer of 2003, Phelps Dodge made a proposal to the Interstate Stream Commission (ISC) and the Office of the State Engineer (OSE) to use Tyrone mine water as a drinking water supply for Hatch, Silver City, Deming, Las Cruces, and their surrounding communities. The proposal was made over the course of three meetings attended by the State Engineer, the Interstate Stream Commission Director and Deputy Director, Interstate Stream Commission counsel, the Phelps Dodge executive in charge of all water rights, a Phelps Dodge hydrologist, and Phelps Dodge attorneys. The proposal was also discussed with New Mexico's federal congressional delegation. NMED Exhibit 32 at 7; Roepke, Tr. Vol. 16, p. 4086, lines 16-32; p. 4087, lines 17-19, p. 4088, lines 6-16; NMED Exhibit 34.

254. Phelps Dodge proposed to provide approximately 6,000 acre-feet of its Gila River surface water rights and 4,300 to 6,600 acre-feet of their Tyrone Mine ground water to be treated and piped to Silver City and Deming, and outside the region, to Hatch and Las Cruces. This proposal is referred to as "Exchange A" in NMED Exhibit

34. In return, Phelps Dodge would get 6,000 acre/feet of Gila River water. NMED Exhibit 32 at 7, Roepke, Tr. Vol. 16, p. 4089, line 14 to p. 4090, line 21; NMED Exhibit 34.

255. Phelps Dodge further proposed that the federal funding would be used to build and operate a treatment plant for the contaminated water from the Tyrone Mine open pits and to build the piping and infrastructure to the various points of delivery. NMED Exhibit 32 at 7; Roepke, Tr. Vol.16, p. 4091, lines 6-16; NMED Exhibit 34.

256. The Interstate Stream Commission rejected Phelps Dodge's proposals. Mohr, Tr. Vol. 22, p. 5536, lines 1-24.

257. Water throughout southern New Mexico is scarce. Roepke, Tr. Vol. 16, p. 4083, lines 1-3.

258. Given the expected and potential growth in southwest New Mexico, Texas, and Mexico, Phelps Dodge's proposal to pipe treated ground water from Tyrone Mine to Silver City, Deming, Hatch, Las Cruces, and their environs represents a reasonable and foreseeable future use of that ground water. Roepke, Tr. Vol. 16, p. 4092, line 17 to p. 4093, line 4.

259. The State Engineer has declared and closed most of the Mimbres and Lower Rio Grande Basins as a result of declining aquifers upon which the great majority of communities in southern New Mexico depend for their municipal supplies. Las Cruces and Hatch are in the Lower Rio Grande Basin. "Declared" means that a person who wants to appropriate and use water in the basin must first get a permit from the State Engineer. "Closed" means that no new water uses may be appropriated in the basin. In addition, hydrologic modeling indicates that even in areas not closed in the Mimbres,

water is fully appropriated. As such, except for domestic well permits which by statute the State Engineer cannot deny, the State Engineer cannot permit new uses of water because they would impair senior rights. Roepke, Tr. Vol. 16, p. 4083, line 11 to p. 4804, line 16.

260. The State Engineer has declared the Gila-San Francisco Basin. The portions of the Gila-San Francisco Basin that are not already closed have been modeled as fully appropriated. There is no un-appropriated water in the basin. Roepke, Tr. Vol. 16, p. 4101, line 14 to p. 4102, line 4.

261. Mr. Mohr testified that he has had ongoing periodic discussions, including as recently as two or three months from the date of his testimony, with the Mayor of Silver City to discuss the possibility of transfer or sale of Tyrone's water rights in the future. In connection with those discussions, Mr. Mohr testified that he reviewed the 40-year water plan "to get a feel for what the probable future use of water needs are for the community." Mohr, Tr. Vol, p. 291, line 21 to p. 292, line 14.

262. Several independent reports have been prepared to evaluate the future demand for water and supply for water in the Silver City/Grant County area. These reports project that the demand for water in Silver City/Grant County will exceed current supply in the foreseeable future. NMED Exhibits 29, 29B, 30 and 31.

263. At the request of the Interstate Stream Commission, the Office of the State Engineer prepared a report entitled Analysis of Effects of Ground Water Development to Meet Projected Demands in Regional Planning District 4 Southwest New Mexico (State Engineer's Office, M. Johnson, et al. Mar. 2002)("OSE Report"). NMED's expert witness on future water demand, Michael Johnson, was the principal author of

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the section in the OSE Report to evaluate the adequacy of existing ground water supplies to meet municipal demands through 2060 for the central Grant County area. NMED Exhibit 29; NMED Exhibit 27 at 4-5; Johnson, Tr. Vol. 16, p. 3925, line 8 to p. 3926, line 9.

264. Prior to the OSE Report, the OSE also prepared a report entitled Projected Water Demands in Grant, Hidalgo, and Luna Counties, New Mexico, 2000 to 2040 (December 2001)("OSE Projected Water Demands Report"). This earlier report based the water demand projections on population projections prepared by Dr. Adelamar Alcántara, set forth in Table 1 of the report and published in Dr. Alcántara's report, Population Levels and Trends in Nine New Mexico Water Planning Regions: 1960-2060 (1996). NMED Exhibits 29 at 10; NMED Exhibit 27 at 6-7; NMED Exhibit 29B at 2-5; Johnson, Tr. Vol. 16, p. 3926, line 16 to p. 3927, line 6.

265. The OSE Report describes the hydrogeologic setting in the region and the well field conditions of Silver City and the surrounding communities. The well fields are located in the Mimbres and Gila-San Francisco Basins. The OSE Report includes future demand for water from municipal, commercial, industrial, mining, and power sources. NMED Exhibit 29 at 9-10, 12-13; NMED Exhibit 27 at 5-9; Johnson, Tr. Vol., p. 3926, lines 10-21; p. 3927, line 10 to p. 3933, line 7.

266. Water levels have declined in the vicinity of pumping wells in the area as pumping has mined ground water from storage in the basin-filled aquifer. Some of the most significant water-level declines have occurred in the vicinity of the wells supplying municipal demands. For example, depth to water at the Franks well field was initially less than 250 feet, but from 1946 to 2000 declined to a depth of over 300 feet,

an average annual rate of decline of nearly one foot per year. NMED Exhibit 27 at 9; Johnson, Tr. Vol. 16, p. 3933, line 9 to p. 3934, line 23.

267. The water table in the Mimbres Basin has dropped about 50 feet over the past 50 years. NMED Exhibit 31 at 7-14.

268. Presently, outflows from the Mimbres Basin are estimated to exceed inflows by 33,680 acre-feet per year. Inflows from the Gila-San Francisco Basin exceed outflows by only 30 acre-feet per year. NMED Exhibit 31, Table 7-1; Roepke, Tr. Vol. 16, p. 4074, lines 15-17.

269. Most of the wells servicing Silver City and surrounding communities are located in the Mimbres Basin; a few are located in the Gila-San Francisco Basin. NMED Exhibit 29 at 12-13 and Plate 3; NMED Exhibit 27 at 7-9; Johnson, Tr. Vol., p. 3928, lines 14-17 and 22-23; p. 3930, lines 21-22.

270. Municipal demand for water in the Silver City area will likely exceed the supply available from existing sources by the year 2040 or 2060, and the Town of Silver City and surrounding communities will need to seek new sources of water in the near future. NMED Exhibit 29 at 3, 19-21; NMED Exhibit 27 at 3, 11-13; Johnson, Tr. Vol., p. 3921, line 21 to p. 3922, line 2.

271. The OSE Projected Water Demands Report projects that municipal demand from Silver City and the communities it serves (Arenas Valley, Pinos Altos, Rosedale, and Tyrone) will exceed its permitted diversion of 4,566.64 acre-feet/year by 2040. NMED Exhibit 29B, Table 3; NMED Exhibit 27 at 6.

272. The Town of Silver City commissioned a report entitled Supplement on Water Use and Wellfield Service – Town of Silver City Water Plan ("Silver City Water Plan") (Balleau Groundwater, Inc. April 2006). NMED Exhibit 30.

273. The Silver City Water Plan evaluates the municipal demand for water for the 40-year period, 2005 to 2045. It uses two growth schedules of water demand, low and high, with annual growth rates of 1.2 percent and 2.9 percent respectively, based on observed growth rates in the number of connections to Silver City's municipal water system from 1993 to 2004. NMED Exhibit 30 at 14-16 and Fig. 14.

274. The Silver City Water Plan projects that municipal water demand will exceed permitted diversions by 2021 under the high growth scenario and by 2043 under the low growth scenario. The plan also projects, based on a population growth rate of 1.31 percent, that the Town's demand for water will exceed its permitted use in 35 years, by 2040. NMED Exhibit 30 at 14, 16, 17 and Fig. 14.

275. The Town of Silver City submitted comments for this proceeding. See August 6, 2007 Letter from James Marshall, Mayor, Town of Silver City, to the Commission ("Silver City Comments"). Prior to submitting its comments, the town reviewed the 2007 Alcántara report and the report prepared by Dr. Brian McDonald, Tyrone's witness on population growth and demand, as well as other reports. The Town concluded that, "[m]ost analyses forecast increasing demand." The town stated that it would continue to rely upon the Silver City Water Plan for water planning purposes. Silver City Comments at 1.

276. The Town stated that its "most pressing issue" is water rights because under the high growth scenario (2.9 percent), the Town would exceed its permitted use by 2021,

and under the low growth scenario (1.2 percent), the Town would exceed its permitted use by 2043. Silver City Comments at 1-2.

Population Trends

277. Adelamar Alcántara, NMED's expert witness on population trends, has 30 years of social science research experience and 20 years experience in demographic research, which includes population estimates and projections. She has been the State Demographer at the University of New Mexico ("UNM") Bureau of Business and Economic Research ("BBER") since October 1988. Dr. Alcántara serves as the liaison to the Bureau of the Census Federal State Cooperative on Population Estimates and Population Projections. She is also adjunct faculty in the graduate program of the Community and Regional Planning, UNM School of Architecture and Planning. She has served as a research consultant and assistant for Ateneo de Zamboanga University in the Philippines, The Population Council in Manila, the East-West Center Population Institute in Hawaii, the Population Center Foundation in Manila, and Commission on Population in Manila. Dr. Alcántara holds a bachelor's degree in philosophy, and doctorate and master's of art degrees in sociology with specialization in population studies and demography from the University of the Philippines. NMED Exhibit 26; Alcántara, Tr. Vol. 14, p. 3401, line 11 to p. 3404, line 8.

278. NMED commissioned Dr. Alcántara to produce population projections for areas in and around the Tyrone Mine, including Grant County and the surrounding counties between the present and 2060. Dr. Alcántara and her staff at BBER prepared a report titled "Population Levels and Trends in Grant County and Surrounding Counties" ("Alcántara Report"). NMED Exhibit 25; Alcántara, Tr. Vol. 14, p. 3405, lines 2-20.

279. Dr. Alcántara prepared the population projections pursuant to a contract with NMED and a prior contract with the Interstate Stream Commission ("ISC") to be used for the State Water Plan. BBER will use the same population projections used in this proceeding for the ISC's State Water Plan. Alcántara, Tr. Vol.14, p. 3405, line 21 to p. 3406, line 9.

280. To prepare the county population projections, Dr. Alcántara used the "cohort-component" methodology. The components of growth in this methodology are fertility, mortality and migration. To prepare the sub-county population projections, Dr. Alcántara used the "ratio technique." Alternative methods of population projections can be used; however, for most long-term projections, the cohort-component method is most frequently used because it allows demographers to draw on historical trends and their specialized knowledge of each of the components of population change. Alcántara, Tr. Vol. 14. p. 3407, line 9 to p. 3408, line 22; p. 3422, line 18 to p. 3423, line 6; p. 3439, lines 6-9; NMED Exhibit 25 (Alcántara Report, p. 8).

281. The methodologies employed by Dr. Alcántara and BBER staff are accepted within the field of demography as valid methodologies for projecting population trends. Alcántara, Tr. Vol. 14, p. 3409, lines 5-9.

282. Dr. Alcántara's projections have been very accurate in the past. Dr. Alcántara projected the state population for the 1990 census and came within 300 people of the enumerated census. She projected the state population for the 2000 census and came with 2000 people of the census. This represents a margin of error of less than one-tenth of one percent. Dr. Alcántara projected that Grant County would have a population of 31,655 in 2000; the actual count was 31,002 and the adjusted number, based on the U.S.

Census Bureau's undercount was 31,358. Alcántara, Tr. Vol. 14 3427, line 3 to p. 3428, line 8; p. 3425, lines 9-22.

283. Projections over the longer term are more difficult to make; however, population has its own dynamic and, based on demographic research, fertility, and mortality within a population have predictability. Migration is more difficult to predict, although there are patterns among populations that have been tried and tested over long periods of time. Alcántara, Tr. Vol. 14, p. 3421, line 4 to p. 3432, line 25.

284. The cohort-component methodology does not include economic activities per se; the historical data included in the model (fertility, mortality, migration) are the result of all other activities in the county, including economic activity, and would encompass the economic ups and downs of the Tyrone Mine. Dr. Alcántara's projections take account of the effect of mining employment on population in Grant County because the changes over time are caught by the census. While mining employment does not figure in a direct calculation, it is factored into the censuses. Alcántara, Tr. Vol. 14, p. 3527, line 3 to P. 3430, line 2.

285. Dr. Alcántara's report shows the population estimates from 1960 to 2000, based on decennial U.S. Census Bureau data and the annual growth rate by decade for each county and sub-county population. NMED Exhibit 25 (Alcántara Report, Table 2 on p. 6); Alcántara, Tr. Vol. 14, p. 3414, lines 13-16.

286. The population of Grant County had positive growth each decade between 1960 and 2000, increasing from 18,700 to 31,002, adding over 12,000 people. In particular, the population of the county grew from 27,776 in 1990 to 31,002 in 2000. NMED

Exhibit 25 (Alcántara Report, p. 3 and Table 2 on p. 6); Alcántara, Tr. Vol. 14, p. 3415, lines 3-4.

287. The population of Grant County is projected to increase each decade between 2000 and 2060, from 31,002 to 49,670 people, an increase of approximately 18,000 people. The annual growth rate for the county during that 60-year period is projected to be between 0.63 percent and 1.18 percent. NMED Exhibit 25 (Alcántara Report, Table 2 on p. 6); Alcántara, Tr. Vol. 14, p. 3416, lines 8-13.

288. The population of Silver City is projected to increase each decade between 2000 and 2060, from 10,545 to 19,850 people. The annual growth rate for Silver City during that 60-year period is projected to be between 0.64 percent and 1.54 percent. NMED Exhibit 25 (Alcántara Report, Table 2 on p. 6); Alcántara, Tr. Vol. 14, p. 3416, line 19 to p. 3417, line 1.

289. The population of the balance of the county is projected to increase each decade between 2000 and 2060, from 14,515 to 22,583 people. The annual growth rate for the balance of the county during that 60-year period is projected to be between 0.45 percent and 1.23 percent. NMED Exhibit 25 (Alcántara Report, Table 2 on p. 6).

290. Brian McDonald, Tyrone's expert witness on population trends in Grant County, is a self-employed economic consultant offering a range of economic consulting services, including economic and fiscal impact analysis, and regional economic analysis and projections, New Mexico state and local taxation issues and litigation support. Between 1978 and 1999, Dr. McDonald was employed at BBER, most of that time as director, and was responsible for a research organization which regularly produced both short-term and long-term economic and demographic projections of New Mexico and

its 33 counties, conducted economic and fiscal impact analyses, provided analysis of state and local taxation issues to the state legislature, carried out survey research, and provided information services regarding the New Mexico economy and population. Dr. McDonald holds a bachelor's of art degree and a doctorate degree in economics from Georgetown University and from the University of Pennsylvania, respectively. Tyrone Exhibit 908, Att. 1; McDonald, Tr. Vol. 5, p. 1296, line 24 to p. 1298, line 10.

291. Dr. McDonald testified that there are currently 1,241 jobs at Tyrone and Chino. Using the historical relationship of the loss of 1.71 per person per mining job yields an estimated Grant County population decline of approximately 2,100 persons once these two mines close by 2017. With the permanent closing of both the Tyrone Mine and the Chino Mine, Grant County will lose a major anchor of its local economy that has provided many high paying jobs over many decades. Tyrone Exhibit 908, Att. 2, at 15-15; Mc Donald, Tr. Vol. 5, p. 1305, lines 7-13.

292. Dr. McDonald agreed, however, that the importance of mining employment and mining as a percentage of total employment in Grant County has declined since the 1980s. McDonald, Tr. Vol. 5, p. 1335, line 1 to p. 1337, line 19.

293. Dr. McDonald concluded that the most likely outlook for population growth in Grant County to the year 2040 is no change from the U.S. Census Bureau 2006 population estimate of 29,792 persons. McDonald, Tr. Vol. 5, p. 1304, line 22 to p. 1305, line 6.

294. The *Southwest N.M. Regional Water Plan* (Daniel B. Stephens & Associates, May 2005) estimates population trends for Grant County through 2040. The projections are based on low growth and high growth scenarios and were produced by Southwest

Planning & Marketing in 2004. The plan predicts that the population in Grant County and Silver City will increase by 2040. It estimates that by 2040 Grant County's population will be 34,335 under the low growth scenario and 39,847 under the high growth scenario. It estimates that by 2040 Silver City's population will be 11,881 under the low growth scenario and 14,201 under the high growth scenario. NMED Exhibit 31 at 6-25, Table 6-14, App. EE4, pages 2-4.

295. The *Southwest N.M. Regional Water Plan* recognizes that while the economy of Grant County has historically been driven by mining, "a variety of economic development efforts are ongoing, and the area is increasingly becoming an attractive location for retirees." NMED Exhibit 31 at 6-27.

296. The low water use projections for the mining section in each county are based on the 2000 OSE values (Wilson et al., 2003) and no growth in this sector. The high water use projections are based on the estimated current water rights (ground water) for the Phelps-Dodge Chino, Cobre, and Tyrone mines in Grant County. NMED Exhibit 31 at 6-25, Table 6-36; Tables 6-14 and 6-16.

297. The *Southwest Regional Water Plan* acknowledges that "[s]ince about 2000, copper mine in the county have been in reduced production and therefore using less water than a few years prior to 2000. Nevertheless, it is expected that copper mining and reclamation activities will continue in the region for the next 30 to 40 years or more. Water previously used for mining operations may be used for reclamation activities. For example, Phelps Dodge estimates that nearly 9,000 ac-ft/yr of fresh water will be required to be blended with contaminated groundwater." NMED Exhibit 31 at 6-35 and 6-36.

298. The Town of Silver City in its 40-year water plan, *Supplement on Water Use and Wellfield Service - A 40-Year Water Plan for the Town of Silver City* (Balleau Groundwater Inc., April 2006), relies on an annual growth rate of 1.31% for the Town between 2005 and 2040. NMED Exhibit 30.

<u>Institutional Controls</u>

299. Institutional controls have been used in New Mexico under the state's Voluntary Remediation Program, 20.6.3.1 NMAC, through which NMED encourages the voluntary cleanup of contaminated properties, including ground water. The Voluntary Remediation Program provides an example of the uses of institutional controls. Garber, Tr. Vol. 3, p. 554, lines 2-16; Olson, Tr. Vol. 7, p. 1896, lines 5-10.

300. New Mexico's Solid Waste Management Program may include the use of institutional controls to restrict the use of land. The program requires the owner or operator of the landfill site being closed to record a restriction on the land's use. Garber, Tr. Vol. 3, p. 556, lines 9-25.

301. As used in the Voluntary Remediation Program, institutional controls imposed at a site control the disturbance of the surface soils so that any remaining contaminants at the site do not pose a threat to public health through inhalation or ingestion, but the institutional controls do not necessarily limit the use of ground water at the site. Olson, Tr. Vol. 7, p. 1897, line 9 to p. 1898, line 15.

302. Institutional controls that restrict access to ground water have been used in New Mexico as a temporary measure while ground water remediation takes place, but not for the purpose of waiving cleanup requirements. Olson, Tr. Vol. 7, p. 1954, line 8 to p. 1957, line 2.

303. The legal effect, duration, enforceability, and limitations of restrictive covenants, easements, and other land-use covenants (collectively "institutional controls") depend on the specific terms and conditions set out in written documents. Garber, Tr. Vol. 22, p. 5474, lines 12-19; Mohr, Tr. Vol. 22, 5573, line 17 to p. 5574, line 10: Salmon, Tr. Vol. 12, p. 2987, lines 4-24.

304. NMED can enforce institutional controls against a permittee only when they are incorporated as conditions of a discharge permit. Olson, Tr. Vol. 8, p. 2054, lines 16-25 and p. 2055, line 1-6.

305. NMED has experienced problems with the implementation, monitoring, and enforcement of institutional controls at sites in New Mexico. Olson, Tr. Vol. 7, p. 1890, line 22 to p. 1893, line 25.

306. For example, the remedy for the Cleveland Mill Site, a former hard rock mine in Grant County, included restrictive covenants to prevent property owners from disturbing the cover and underlying waste material and to restrict use of ground water. NMED staff interviewed local officials to determine whether the institutional controls were being monitored and enforced. These officials were not aware that waste materials had been disposed of on the site or that the site was subject to land use restrictions. NMED Exhibit 1 at 17; Olson, Tr. Vol. P. 1890, line 25 to p. 1892, line 6; NMED Exhibit 5.

307. NMED agrees that the continuation of institutional controls at the Cleveland Mill Site is required for the proposed closure of the site. Olson, Tr. Vol. 8, p. 2062, lines 1-15; Tyrone Exhibit 917 (September 9, 1999 letter from Greg Lewis to Myron Knudsen).

308. The New Mexico State Engineer has imposed institutional controls that temporarily restrict access to ground water at several Superfund sites, including the Fruit Avenue site in Albuquerque and the North Railroad site in Española. Olson, Tr. Vol. 7, p. 1936, lines 22-25 and p. 1937, line 1-13.

309. In the cases of the Fruit Avenue site in Albuquerque and the North Railroad site in Española, NMED requested that the Office of the State Engineer restrict access to ground water by denying water rights permits as a temporary use restriction until ground water cleanup has been achieved. Olson, Tr. Vol. 8, p. 1937, lines 21-25 and p. 1938, line 1-5.

310. In 2005, the U.S. Government Accountability Office ("GAO") conducted a study of institutional controls at sites cleaned up under federal hazardous waste laws titled "Hazardous Waste Sites: Improved Effectiveness of Institutional Controls at Sites Could Better Protect the Public." NMED Exhibit 4.

311. In reaching his opinion that institutional controls often do not work, Bill Olson relied on the GAO study. The GAO report discusses the challenges of implementing, monitoring, and enforcing institutional controls and focuses on how the use of institutional controls at hazardous waste sites can be improved. Olson, Tr. Vol. 7, p. 1887, line 19 to p. 1890, line 10; Tr. Vol. 8, p. 2048, lines 3-13; NMED Exhibit 1, p. 15-17; NMED Exhibit 4.

312. The GAO report in its Results in Brief states in part:

> EPA faces challenges in ensuring that institutional controls are adequately implemented, monitored and enforced. Although EPA has taken a number of steps to improve the management of institutional controls in recent years, we found that controls at Superfund sites we reviewed were often not implemented before site deletion, as EPA requires. In some cases, institutional controls were implemented after site deletion while, in other cases, controls were not

> implemented at all. An EPA program official believed that these deviations from EPA's guidance may have occurred because, during the lengthy period between the completion of the cleanup and site deletion, site managers may have inadvertently overlooked the need to implement institutional controls. Moreover, in terms of monitoring, while EPA reviews Superfund sites where contamination was left in place every 5 years to ensure that the remedy is still protective, EPA officials acknowledged that such site reviews may be too infrequent to ensure the continued effectiveness of the institutional controls.

NMED Exhibit 4, p. 6.

313. The GAO report acknowledges that "[s]tate property laws, which traditionally disfavor restrictions attached to deeds and other land use restraints in order to encourage the free transferability of property, can hinder EPA's ability to implement and enforce institutional controls." EPA's guidance warns that state property laws should be researched to ensure that certain types of institutional control mechanisms can be enforced. NMED Exhibit 4, p. 33.

314. The GAO reports that EPA guidance states that the imposition of institutional controls should be considered in instances in which remediation leaves waste in place that would not permit unrestricted use of the site to ensure protection against unacceptable exposure to contamination. Olson, Tr. Vol. 2036, lines 22-23 and p. 2037, lines 2-7; NMED Exhibit 4, p. 8.

315. NMED supports the use of institutional controls as temporary measures to allow clean up of contaminated ground water. Olson, Tr. Vol. 7, p. 1954, lines 8-25.

316. NMED also supports the use of institutional controls as long-term measures in order to limit access to a contaminated site in certain instances where clean up is still ongoing. Olson, Tr. Vol. 7, p. 1955, lines 8-19.

317. In response to a question about the relevance of institutional controls to the determination of place of withdrawal, Richard Mohr, Phelps Dodge Corporation's

general manager for the Tyrone mining operations and for environmental affairs for all New Mexico operations, stated, "[w]ell, in my mind, the mine is a place of withdrawal of water because we're pumping water out of the -- off of the mine site for mining purposes." Mohr, Tr. Vol. 22, p. 5574, lines 14-16.

318. Mr. Olson does not dispute that the discharge plan for the Village of Questa site incorporates as a material provision letters from the U.S. Forest Service and Feliciano Rael which commit those parties not to drill wells on their properties. Olson, Tr. Vol. 23, p. 5710, line 25, p. 5711, lines 1-10, and p. 5712, lines 2-13.

319. Mr. Olson's rebuttal testimony about NASA WSTF's site distinguished the discharge permit issued to NASA from the ones issued to Tyrone by explaining that DP-1255 (issued to NASA) was limited to re-injection of treated water. Olson, Tr. Vol. 23, p. 5642, lines 4-18.

320. Mr. Olson acknowledged that the contamination plume at WSTF is being remediated under the hazardous waste permit issued by NMED's Hazardous Waste Bureau to meet WQCC standards. Olson, Tr. Vol. 23, p. 5644, line 19 to p. 5645, line 10.

321. If the WSTF site is not remediated to WQCC standards by the Hazardous Waste Bureau, the site would no longer be exempt from WQCC abatement standards and would have to be abated pursuant to Part 4 of WQCC regulations. Olson, Tr. Vol. 23, p. 5650, lines 13-25.

322. Mr. Olson agrees with Mr. Gutiérrez that DP-1255 requires NASA to abide by its memorandum of understanding with BLM to prohibit the drilling of wells until the

ground water is remediated to water quality standards. Olson, Tr. Vol. 23, p. 5649, lines 18-25.

323. Mr. Olson opined that the condition in DP-1255 requiring compliance with the NASA-BLM MOU is intended solely to protect the public from contaminated ground water while the site is being remediated. Olson, Tr. Vol. 23, p. 5650, lines 1-12.

324. Institutional controls are not appropriate criteria for determination of place(s) of withdrawal of water. Olson, Vol. 7, p. 1951, lines 7-12; Tr. Vol. 8, p. 2102, lines 10-25; Tr. Vol. 23, p. 5650, lines 6-12.

Planning Horizon

325. The Department proposes that the Commission define "foreseeable future" as a time period of not less than 200 years in the future. NMED Exhibit 1, at 20; Olson, Tr. Vol. 7, p. 1882, line 21 to p. 1883, line 4.

326. By order dated May 10, 1988, the OCC adopted a time period of not less than 200 years into the future as the definition of reasonably foreseeable future use, and the OCD has subsequently applied this definition to discharge permits for oilfield facilities for the last 20 years. NMED Exhibit 1 at 21-22; Olson, Tr. Vol. 7, p. 1883, line 16 to p. 1886, line 12; NMED Exhibit 9.

327. Dr. Alcántara testified that the term "foreseeable future" is not defined among demographers. A demographer's view of foreseeable future depends on the type of analysis being conducted. Generally, demographers think of short-term projections as 5 to 10 years and long-term projections as 15 years or higher. Standard population projections look 30 years into the future. Standard practice for water planning regions is to look 60 years into the future, while demographers conducting an all-states census

forecast look 100 years into the future. Alcántara, Tr. Vol. 14, p. 3436, line 19 to p. 3438, line 11.

328. Dr. Shomaker testified that in the context of this proceeding he understands the term "reasonably foreseeable" to involve the question of whether one can reasonably expect an individual or a company to put a water supply well in a given location at some foreseeable time in the future, such as during the next 20 to 30 years. He added that in the context of water use planning, projecting beyond those kinds of time frames becomes highly speculative and unhelpful for any genuine planning purpose. Shomaker, Tr. Vol. 6, p. 1472, line 24 to p. 1473, line 8.

329. Dr. Shomaker agreed that, without regard to how precise or accurate a prediction may be, there is value in looking out farther than 40 years. "I think it's instructive to try to look out far into the future. I think it helps guide . . . what the public does in particular." Shomaker, Tr. Vol. 6, p. 1566, lines 21-24.

330. Dr. Shomaker also agreed that requiring residential developers to demonstrate a 100-year water supply is not unreasonable. Shomaker, Tr. Vol. 6, p. 1580, line 17 to p. 1581, line 3.

331. Mr. Johnson testified that looking much beyond 40 or 50 years for regional water planning purposes "is getting rather speculative because of the uncertainties involved." Johnson, Tr. Vol. 16, p. 3970, line 7 to p. 3971, line 5.

332. Tyrone estimates that it must continue to withdraw ground water from the open pits for at least 100 years, in order to keep the pits pumped down as required by DP-1341. Blandford, Tr. Vol. 7, p. 1804, line 20 to p. 1805, line 6.

CONCLUSIONS OF LAW

I. STATUTE AND REGULATIONS

1. The purpose of the Water Quality Act (the "Act") is to abate and prevent water pollution in accordance with its provisions and the regulations of the WQCC. See *Bokum Res. Corp. v. N.M. Water Quality Control Comm'n*, 93 N.M. 546, 555, 603 P.2d 285, 294 (1979).

2. The Act applies to "all water, including water situated wholly or partly within or bordering upon the state, whether surface or subsurface, public or private, except private waters that do not combine with other surface or subsurface water." See NMSA 1978, § 74-6-2(H); see also, 20.6.2.7(zz) NMAC; *N.M. Mining Association v. Water Quality Control Comm'n*, 2007 NMCA 84, ¶¶ 25, 30, 164 P.3d 81, 88, 90.

3. WQCC regulations define ground water as "interstitial water which occurs in saturated earth material and which is capable of entering a well in sufficient amounts to be utilized as a water supply." 20.6.2.7.Z NMAC.

4. In making regulations to prevent or abate water pollution in the state, the Commission gives the weight it deems appropriate to all relevant facts and circumstances, including: (1) character and degree of injury to or interference with health, welfare, environment and property; (2) the public interest, including the social and economic value of the sources of water contaminants; (3) technical practicability and economic reasonableness of reducing or eliminating water contaminants from the sources involved and previous experience with equipment and methods available to control the water contaminants involved; (4) successive uses, including but not limited to domestic, commercial, industrial, pastoral, agricultural, wildlife and recreational uses;

(5) feasibility of a user or subsequent user treating the water before a subsequent use; (6) property rights and accustomed uses; and (7) federal water quality requirements. See NMSA 1978, § 74-6-4(D).

5. Balancing the competing policies of protecting ground water and yet imposing reasonable requirements on industry, the Act allows for reasonable degradation of water quality resulting from beneficial use, including but not limited to domestic, commercial, industrial, pastoral, agricultural, wildlife and recreational uses; provided that "such degradation shall not result in impairment of water quality to the extent that water quality standards are exceeded." See NMSA 1978, § 74-6-12(F).

6. Section 74-6-5(E)(3) of the Act provides that "[d]etermination of the discharges' effect on ground water shall be measured at any place of withdrawal of water for present or reasonably foreseeable future use." NMSA 1978, § 74-6-5(E)(3).

7. The purpose of the WQCC Regulations, 20.6.2.3000 through 20.6.2.3114 NMAC, controlling discharges onto or below the surface of the ground, "is to protect all ground water of the State of New Mexico which has an existing concentration of 10,000 milligrams per liter or less of total dissolved solids for present or potential future use as domestic and agricultural water supply, and to protect those segments of surface waters which are gaining because of ground water inflow, for uses designated in the New Mexico Water Quality Standards." 20.6.2.3101.A NMAC.

8. Sections 20.6.2.3000 through 20.6.2.3114 NMAC are written so that in general:

> (1) if the existing concentration of any water contaminant in ground water is in conformance with the standard of 20.6.2.3103 NMAC, degradation of the ground water up to the limit of the standard will be allowed; and
> (2) if the existing concentration of any water contaminant in ground water exceeds the standard of Section 20.6.2.3103 NMAC, no degradation of the ground water beyond the existing concentration will be allowed.

20.6.2.3101.A NMAC.

9. Except to the extent that existing conditions exceed standards, all ground water having a TDS of 10,000 mg/L or less "shall meet the standards of subsection A [human health standard], B [domestic water supply standards] and C [standards for irrigation use], unless otherwise provided." 20.6.2.3103 NMAC.

10. Section 20.6.2.3106.C of the WQCC Regulations provides that a proposed discharge plan must include any additional information that may be necessary to demonstrate that approval of the discharge plan will not result in concentrations in excess of the standards of section 3103 or the presence of any toxic pollutant at any place of withdrawal of water for present or reasonably foreseeable future use. Detailed information on site geologic and hydrologic conditions may be required for a technical evaluation of the applicant's proposed discharge plan. 20.6.2.3106.C NMAC.

11. Section 20.6.2.3109.C of the WQCC Regulations provides that, except under limited circumstances, NMED can approve a discharge plan only if the applicant demonstrates that the discharge will not result in either concentrations in excess of the standards in section 3103 or the presence of any toxic pollutant at any place of withdrawal of water for present or reasonably foreseeable future use. 20.6.2.3109.C NMAC.

12. The purpose of Part 2, Subpart IV, of the WQCC Regulations, 20.6.2.4101 through 20.6.2.4115 NMAC, is to abate pollution of subsurface water so that all ground water of the State which has a background concentration of 10,000 mg/L or less TDS is either remediated or protected for use as domestic and agricultural water supply, and to remediate or protect those segments of surface waters which are gaining because of

subsurface water inflow, for designated uses, 20.6.2.4101A NMAC; and, to abate surface water pollution so that all surface waters of the State are remediated or protected for designated or attainable uses, 20.6.2.4101.B NMAC.

II. STANDARD OF REVIEW

13. Petitioner Tyrone has "the burden of going forward with the evidence and of proving by a preponderance of the evidence the facts relied upon to justify the relief sought" in its petition. 20.1.3.200(H) NMAC; see also, NMSA 1978, § 74-6-5(O) (1999) (in the hearing, the burden of proof shall be upon the petitioner).

14. If the Petitioner has established a prima facie case, the Department "has the burden of going forward with any adverse evidence and of showing why the relief should not be granted." 20.1.3.200(H) NMAC.

III. PLACE OF WITHDRAWAL OF WATER

A. CRITERIA

15. Site hydrology and geology is an appropriate criterion to determine whether a location is a place of withdrawal for present or reasonably foreseeable future use of water pursuant to section 74-6-5(E)(3).

16. The quality of ground water prior to any discharge from a facility is an appropriate criterion for determining whether a location is a place of withdrawal of water for present or reasonably foreseeable future use pursuant to section 74-6-5(E)(3).

17. Past and current land use in the vicinity of a facility is an appropriate criterion for determining whether a location is a place of withdrawal of water for present or reasonably foreseeable future use pursuant to section 74-6-5(E)(3).

18. Future land use in the vicinity of a facility is an appropriate criterion for

determining whether a location is a place of withdrawal of water for present or reasonably foreseeable future use pursuant to section 74-6-5(E)(3).

19. Past and current water use in the vicinity of the facility is an appropriate criterion for determining whether a location is a place of withdrawal of water for present or reasonably foreseeable future use pursuant to section 74-6-5(E)(3).

20. Potential future water use and potential future water demand in the vicinity of the facility are appropriate criteria for determining whether a location is a place of withdrawal of water for present or reasonably foreseeable future use pursuant to section 74-6-5(E)(3).

21. Population trends in the vicinity of the facility is an appropriate criterion for determining whether a location is a place of withdrawal of water for present or reasonably foreseeable future use pursuant to section 74-6-5(E)(3).

22. Land ownership is not an appropriate criterion for determining place of withdrawal of water for present or reasonably foreseeable future use under section 74-6-5(E)(3).

23. The use or application of institutional controls is not an appropriate criterion for determining place of withdrawal of water for present or reasonably foreseeable future use under section 74-6-5(E)(3).

24. The use of institutional controls to restrict access to ground water beneath the surface and thus to conclude that the ground water is not at a place of withdrawal for reasonably foreseeable future use would be contrary to the WQA. (FOF 298-323).

B. PLANNING HORIZON

25. Based on the evidence in the record, a horizon of at least 100 years is

appropriate under section 74-6-5(E)(3) for demographic projections and concomitant water resource management planning, particularly for hard rock mines such as the Tyrone Mine, which can generate acid rock drainage and consequential ground water contamination for hundreds of years. (FOF 25-29, 33, 325-332).

C. "POINT OF COMPLIANCE"

26. Section 74-6-5(E)(3) of the Act provides that determination of the discharges' effect on ground water shall be measured at *any* place of withdrawal of water for present or reasonably foreseeable future use. See NMSA 1978, § 74-6-5(E)(3) (emphasis added).

27. Section 74-5-6(E)(3) does not establish any specific "point(s) of compliance" for compliance with water quality standards. NMSA 1978, § 74-6-5(E)(3).

28. Nothing in the Act or the Commission Regulations provides for a "point of compliance," hydraulically up-gradient of which ground water need not be protected. See NMSA 1978, §§ 74-6-1 to 74-6-17; 20.6.2 NMAC.

D. DETERMINATIONS

29. Neither the Act nor the WQCC Regulations establish a discharger's property boundary as a place of withdrawal of water where water quality standards shall be measured. (FOF 43-86).

30. Substantial evidence in the record demonstrates that a discharger's property boundary or a boundary over which a discharger otherwise exercises control is not an appropriate boundary for establishing place of withdrawal of water for present or reasonably foreseeable future use under section 74-6-5(E)(3) or under the WQCC Regulations. (FOF 46-51, 67, 68, 71, 74, 79-81, 83).

31. The MMD Permit Boundary at Tyrone is not an appropriate boundary for establishing place of withdrawal of water for present or reasonably foreseeable future use under section 74-6-5(E)(3). (FOF 46-51, 67, 68, 71, 74, 79-81, 83, 86, 110, 114-118).

32. A place of withdrawal of water is not limited to a place on the ground, but extends into the aquifer underlying an area on the ground surface; it need not be a well. (FOF 88, 89, 92, 102-107).

33. NMED has demonstrated by a preponderance of the evidence that the regional and alluvial aquifers underlying portions of the Tyrone Mine site are places of withdrawal of water for present or reasonably foreseeable future use pursuant to Section 74-6-5(E)(3). (FOF 102-114, 142-185).

34. A preponderance of the evidence demonstrates that the hydraulic conductivity of the water-bearing units in the aquifers underlying the Central Mining Area currently produces or is capable of producing water in sufficient amounts to support beneficial use. (FOF 110-124, 142-185).

35. A preponderance of the evidence demonstrates that the quality of the ground water underlying the Central Mining Area was of good quality prior to any discharge from Tyrone's operation of the mining facility. (FOF 186-191).

36. A preponderance of the evidence demonstrates that the quality of the ground water currently entering the Central Mining Area is of good quality. (FOF 165-167).

37. A preponderance of the evidence demonstrates that current industrial land use in the vicinity of the Central Mining Area requires the withdrawal of water for present or reasonably foreseeable future use. (FOF 193, 197, 198)

38. A preponderance of the evidence demonstrates that current agricultural and residential land use in the vicinity of the Central Mining Area within one mile of the MMD Permit Boundary requires the withdrawal of water for present or reasonably foreseeable future use. (FOF 193, 195-198, 219)

39. A preponderance of the evidence demonstrates that the potential future industrial and agricultural land use in the vicinity of the Central Mining Area will require the withdrawal of water for present or reasonably foreseeable future use. (FOF 205-216).

40. A preponderance of the evidence demonstrates that the Fortuna Wells, open pits, pump-back wells, and interceptor wells in the vicinity of the Central Mining Area currently are places of withdrawal of water for present use. (FOF 87, 119, 223-230)

41. A preponderance of the evidence demonstrates that water will continue to be withdrawn from the Fortuna Wells, open pits, pump-back wells, and interceptor wells in the vicinity of the Central Mining Area, such that these wells are places of withdrawal of water for reasonably foreseeable future use. (FOF 237-241, 244-246, 251, 252).

42. A preponderance of the evidence demonstrates that, based on both low-growth and high-growth scenarios, the population trends in the vicinity of the Tyrone Mining facility indicate the population is projected to increase each decade for the next fifty to sixty years. (FOF 285-289, 294-298).

43. A preponderance of the evidence demonstrates that projected future water demand in central Grant County, within which the Tyrone Mine is located, will exceed available water supply from existing sources by 2040. (FOF 270-275).

44. A preponderance of the evidence demonstrates that future demand for water in the vicinity of the Tyrone Mining facility will increase. (FOF 233, 234, 261-276).

45. Tyrone did not meet its burden of going forward with the evidence to demonstrate that, with limited exception, none of the ground water underneath the Tyrone Mine site or within the Tyrone MMD Permit Boundary is a place of withdrawal of water for present or reasonably foreseeable future use under section 74-6-5(E)(3).

46. Substantial evidence supports the finding, based on the criteria enumerated above, that there are a number of locations at the Tyrone Mine site within the MMD Permit Boundary that meet the criteria for identifying places of withdrawal of water for present or reasonably foreseeable future use and where the effects of Tyrone's discharges on ground water can be measured pursuant to section 74-6-5(E)(3). (FOF 113-118, 122-124, 147-149, 157, 161, 163, 167-172, 186, 193, 194, 205, 206, 211, 216, 223-234, 237-246, 248-250, 262, 268-276, 285-289, 294-298).

47. Substantial evidence supports the finding that the Fortuna Wells at the Tyrone Mine are places of withdrawal of ground water for present or reasonably foreseeable future use within the meaning of section 74-6-5(E)(3) of the Act. (FOF 119, 228, 229, 246).

48. Substantial evidence supports the finding that the six parcels of property that are not owned by Tyrone or affiliated companies located within the MMD permit boundary are places of withdrawal of ground water for reasonably foreseeable future use within the meaning of section 74-6-5(E)(3) of the Act. (FOF 12, 120).

49. Substantial evidence supports the finding that the locations identified by Mr. Marshall throughout the area of the Tyrone Mine site inside the MMD Permit Boundary may be places of withdrawal of water for reasonably foreseeable future use within the meaning of section 74-6-5(E)(3) of the Act. (FOF 124, 125, 142-185).

50. Substantial evidence supports the finding that it is reasonably foreseeable that the ground water that Tyrone withdraws and treats inside the MMD Permit Boundary after mining ceases will be beneficially used by Tyrone and by third parties for various purposes, including domestic and agricultural use for up to 100 years into the future. (FOF 242-252, 261).

51. The effects of Tyrone's discharges into ground water may be measured at any place within the MMD Permit Boundary where the hydraulic conductivity of the underlying water-bearing units is at least 0.05 ft/day and is capable of producing water in sufficient amounts to support beneficial use. (FOF 92, 102-118).

D. ALTERNATIVE ABATEMENT STANDARDS

52. If it is not technically feasible for water quality standards to be met in ground water underneath the Tyrone Mine, the appropriate remedy for Tyrone is to seek alternate abatement standards under the Commission Regulations at section 20.6.2.4103.F NMAC

FINAL ORDER

Based on the foregoing Findings of Fact and Conclusions of Law, and in accordance with 20.1.3.600 NMAC, the Water Quality Control Commission enters the following Final Order:

A. NMED shall, consistent with the Commission's findings and conclusions, identify places of withdrawal of water for present or reasonably foreseeable future use, and identify appropriate locations at which Tyrone's discharges' effects on ground water shall be measured.

B. NMED and Tyrone shall negotiate the appropriate systems model and modeling parameters to determine the effectiveness of DP-1341 Conditions 4 and 17 to prevent and reduce ground water contamination at the identified places of withdrawal of water for present or reasonably foreseeable future use

C. Thereafter, NMED shall, in consultation with Tyrone, determine the effectiveness of DP-1341 Conditions 4 and 17 to prevent and reduce ground water contamination at the places of withdrawal of water for present or reasonably foreseeable future use identified in accordance with criteria set out in this Order.

D. The parties shall comply with this order within eighteen months of date signed below.

NEW MEXICO WATER QUALITY CONTROL COMMISSSION

By: ______________________

Date: 2/4/09